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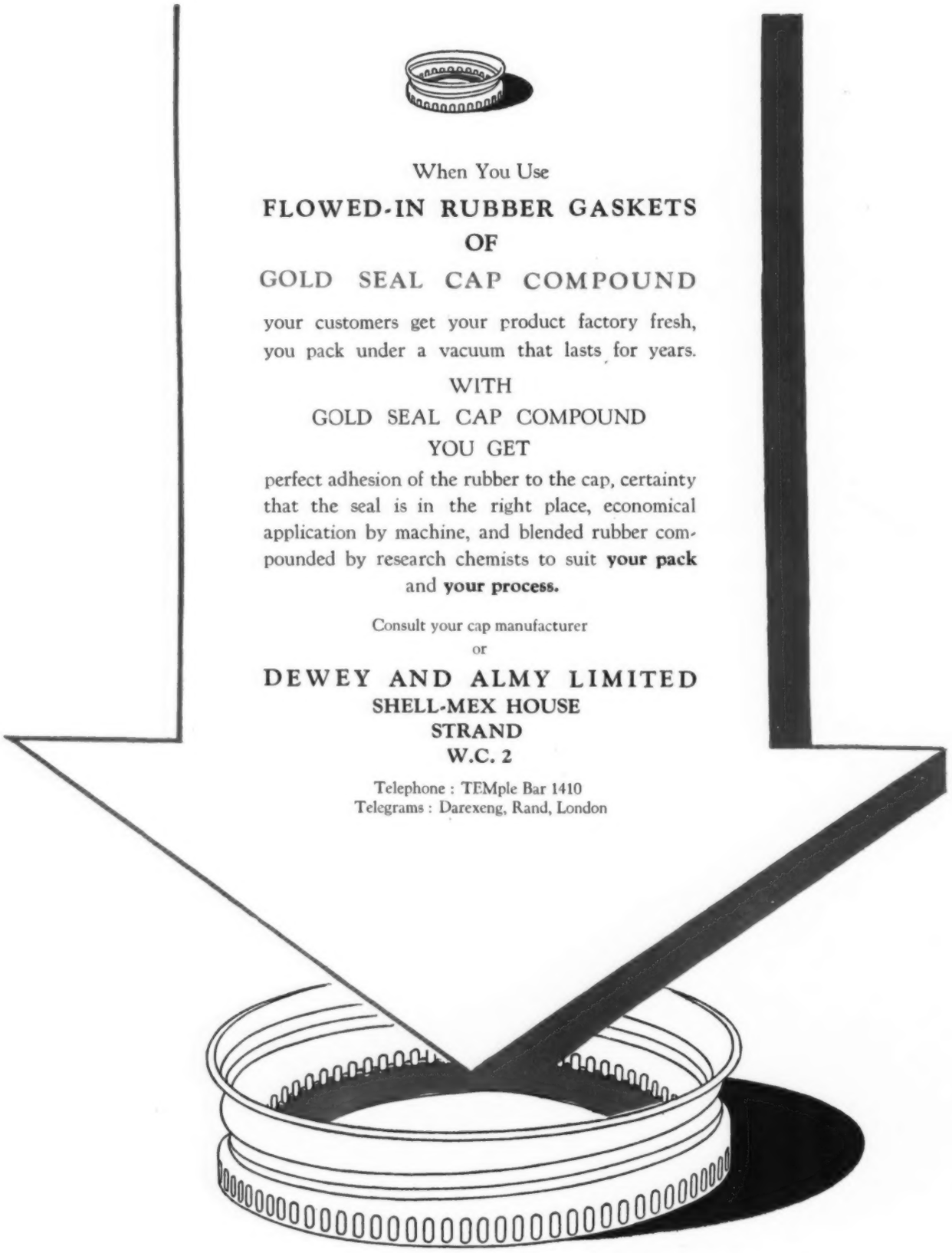

A JOURNAL DEVOTED TO THE PRODUCTION AND MANUFACTURE OF: Chocolate, Confectionery, Biscuits, Bread, Cake; Jam; Glacé, Candied and Preserved Fruits; Fruit Juices and Cordials; Jellies, Honey and Lemon Curd; Cheese and Milk Products, Infant, Breakfast and Invalid Foods; Ice Cream; Canned Foods; Meat, Fish and Vegetable Products; Soups, Pickles, Sauces, Pastes and Extracts, and all edible commodities involving a process of manufacture

FOOD MANUFACTURE

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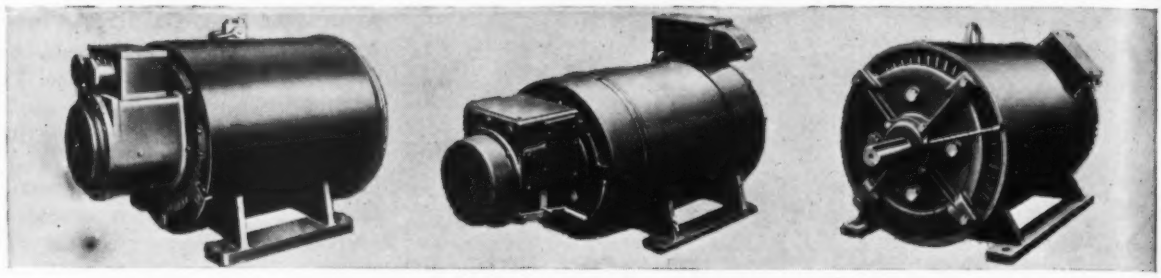

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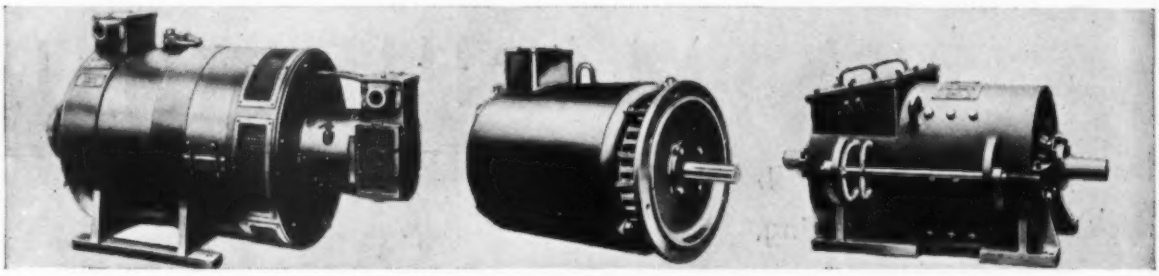

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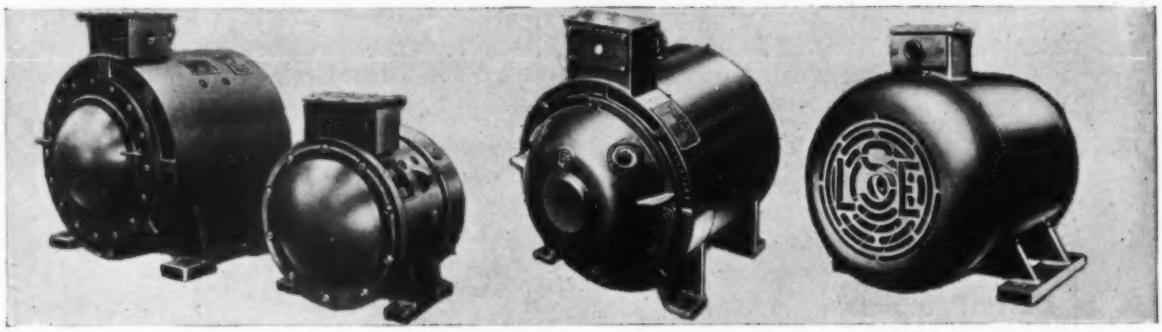

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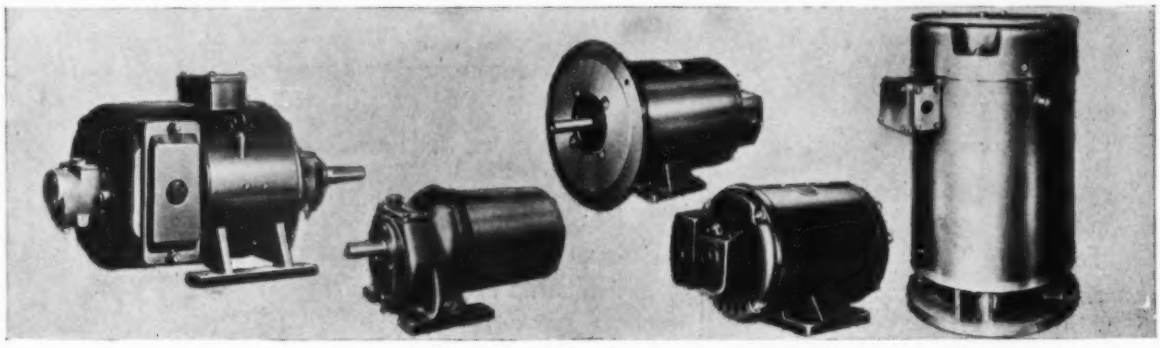

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FOOD MANUFACTURE

Vol. XII, No. 11 November, 1937

Vitamins in Various Foods

THE EVALUATION of food values is becoming a special branch of applied mathematics. Surveys of diets eaten in various income groups are being made, the composition of the diets are determined in calories, proximate principle minerals and vitamins and the whole composition of foods making up the different diets are being classified in tabular form. Of course the whole thing is, as yet, in its infancy, but one stage of the solution of the diet equation has been reached by the American workers Daniel and Munsell of the bureau of home economics of the U.S. Department of Agriculture. They have concentrated on the vitamin factor. They have made a wide survey of all relevant literature and have set out their detailed results in one large table for the vitamins A, B (B_1), G (B_2), C and D. The main conclusions are set out in a smaller table. The evaluation of the vitamins is made in terms of international units, Sherman units and American Drug Manufacturers' Association units. Factors are given for converting the two last into the first, but Daniel and Munsell do not approve of this procedure as it gives to values expressed in the variable biological units of animal response a definite and absolute value which they do not actually possess. This work must have been of a wearisome and painstaking nature and involved an enormous amount of labour. It also includes a table of the ascorbic acid content of foodstuffs, worked out by chemical titration, and guidance is given on the proper way to use international standards in making biological estimation of the vitamin content of foodstuffs. The pamphlet (Miscellaneous Publications U.S. Dept. Agric., No. 275) should prove of interest and value to all workers in the field of vitamins.

Poisoning from Cream

The possibility of food poisoning from the consumption of food in which a staphylococcus has elaborated an enterotoxin has been a recognised risk in America since Jordan's work in Chicago in 1931. Mostly the food responsible has contained custard or made-up cream, but outbreaks have been traced directly to milk. Recent investigations by Shaughnesy and Grubb have shown that in each of a number of such outbreaks in which milk supplies from small farms were implicated, cows were suffering from staphylococcal mastitis. This situation is not, of course, confined to America. A similar outbreak was recorded in Wales in 1935, the incriminated food being an ordinary baked custard made from custard powder and Grade A milk having a moderate content of staphylococcus aureus. The cows appeared healthy, but the same type of organisms was found in the milk taken directly from them. A gastrotoxin was isolated only from the organisms grown from the custard. It seems that the particular toxin which is capable of producing gastro-enteritis may be generated only when the organism is grown in certain media, notably milk, custard, made-up cream or ice-cream, especially when prepared by the " cold mix " method, though the low temperature at which ice-cream is kept diminishes the risk of bacterial growth. An outbreak occurred in San Francisco affecting 110 people in 1936, and it seemed likely that the cream custard became contaminated during its preparation in a bakery. The American Health Departments are, therefore, tending to concentrate their preventive efforts on the processes of preparation, and a comprehensive set of regulations has been recently promulgated by California State Board of Health.

The New Regulations

As to the regulations promulgated in California we will make brief reference to some of them, but any manufacturers really interested in the subject should consult the original regulations to be found in Public Health Reports (Washington), 1937, vol. 52, p. 930. After enunciating that all commercially prepared custards or cream fillings must be made under conditions of cleanliness involving

all stages of its manufacture, the regulations go on to stipulate that only efficiently pasteurised milk may be used. The temperature and time of heating the mix shall be, as a maximum, the equivalent of a temperature of 140° F. for a period of 1 hour. After cooking the custard used for filling éclairs or cream puffs or closed shells it must be put into shallow sterilised containers and chilled without delay to 50° F. The custards must be kept in the cooling room until used for making pastries. The filling apparatus, which must be all metal or rubber, must be cleaned with boiling water and sterilised brushes, or with live steam under pressure. Before use the filling apparatus must be sterilised by boiling for 10 minutes or steaming for 1 hour. The constituents of the so-called cream used for pastry filling vary. In the Cardiff outbreak they were pasteurised cream, marshmallow powder and Chinese egg white. The latter was suspected as the source of infection as it was likely to contain duck egg. A subsequent infection in South Wales, however, was caused from a filling in which local eggs had been used, which indicates that the Chinese eggs had been wrongly suspect. It is always difficult to trace infection back to its origin, almost impossible, and it would probably be advisable in this country to follow the American practice of exercising control at the place where the cream or custard is prepared. It may not eliminate all the possibilities of infection, but it would do much good.

Bread Flavour

The hardy annual of the baking industry—flavour in bread—is continually bursting into bloom, disappearing and reappearing again. In the current issue of Cereal Chemistry, Cathcart, of the American Institute of Baking, Chicago, has contributed a further study on the subject. He tells us that the American Institute of Baking, which has always been interested in bread flavour and the affecting factors, started experiments in earnest in June, 1935. The purpose was to determine what constitutes good flavour (it is interesting to note that aroma is coupled with taste to form the composite sensation of flavour) in bread, and, if possible, to discover the preference of consumers apart from palatability. The procedure adopted was to prepare the bread by varying one factor at a time. The samples were then submitted to the judges, who were asked to disregard all factors other than aroma and taste alone. Between each test the judges had a drink of water. Cathcart states that one purpose of the study was to work out a practical method of test that may be used by any baker or miller in any part of the country to determine taste preferences of consumers in his own territory. Results obtained in one area may not be useful to a baker or miller in another district, as it is recognised that tastes are different in different territories. While not of great universal value in throwing much light on the problem of bread flavour in general, the work seems to have some sort of commercial value in fixed areas and may enable local bakers to minister to the local fancy and so sell more bread.

Storage of Eggs

In our Editorial Comments for March, 1933, we referred to the watery white of egg, one of the defects shown by "candling" eggs, and pointed out that it was possible to produce this condition in almost any normal fresh egg merely by shaking it. We stated then that we understood that researches were in progress at Cambridge to investigate this interesting subject. Among the many problems studied by the Food Investigation Board and discussed in the Report for 1936 the transport and storage of eggs is most interesting, and much light is thrown on these matters. White of egg is not homogeneous, but consists of an outer layer of thin watery consistence, a middle thick jelly-like layer, and a third more fluid layer near the yolk. The relative weights of these layers alter on keeping. At low temperatures both middle and inner layers decrease, while at 25° C. the inner layer remains fairly constant, but the middle one decreases, owing, apparently, to changes in the mucin content. Eggs deteriorate rapidly at summer temperatures, the yolk being affected before the white. It was found that after 6 days at 25° C. and 80 per cent. humidity, the yolk, when boiled, was "flat", after 15 days had a distinct "storage flavour", and in 3 weeks it was uneatable. On the other hand, a large experiment now in progress has shown that eggs keep fairly well at a low temperature for many months either in air or in mixtures of air and carbon dioxide or carbon dioxide alone. Since the grading was done by candling, which depends on the transmission of light, and is affected by the thickness of the shell, the results may not be quite trustworthy. It was found by the research staff of Messrs. Lyons, however, that except for steam poaching the eggs drawn from store were satisfactory, those stored in air or mixtures low in carbon dioxide giving the best results. One thing is certain, eggs should be stored in as cool a place as possible.

Effect of Moulds

Another interesting study is the effect of moulds. The surface of an egg-shell may harbour from 200 to 500 spores of moulds. If the egg is stored in air of very high humidity the spores develop and surround the shell with a mycelial coating from which threads may penetrate into the white. Unfortunately if it is sought to avoid mould by storage in a very dry atmosphere the evaporation of moisture will enlarge the air space and thus will afford a certain indication of age. It has been found that certain chemicals will prevent the growth of these moulds, but there is the legal aspect to be considered in connection with the use of chemicals which may penetrate the shells and affect the contents. High concentrations of carbon dioxide are effective and give a better quality of yolk than do low concentrations. Apparently there is a most varied mucroflora spread on the outside of the egg-shells—a fact not to be wondered at—but there is very little evidence of contamination of the interior. It does, however, happen, and the common green rot is due to infection of the white with pseudomonas, sometimes in almost pure cultures, while black rot is due to a variety of organisms. Strangely enough, washing seems to increase the risk of bacterial infection by removing the surface coating which normally prevents bacteria passing through the shells. For periods up to 12 hours' exposure to bacterial infection the shell membrane appears to prevent penetration into the white, but after further incubation the white is heavily infected. The conclusion is reached that if washed eggs are dried and kept free from infection no harm should be done.

Race Suicide

Ancestor worship is an original instinct of the human race, still actively carried on by certain sections of it. But as far as posterity is concerned the familiar quip, " Posterity has done nothing for me, why should I do anything for posterity?" seems broadly to define the general attitude of the ordinary citizen of to-day.

True, he insures himself for the benefit of his immediate progeny. He may possibly be quite interested in the welfare of his grandchildren, but only the specialists try to bring home to him that his great-grandchildren, in the opinion of the experts, have scant hope of being born if things go on as they are doing now.

A year or so ago we were informed that in all probability insects would inherit the earth—after blotting out *Homo Sapiens* mainly by eating his food. That scare has died down, although not necessarily to be ignored. But having mentally lopped off this particular head of the Hydra, others have taken its place—others which cannot be lightly dismissed if Man of to-day has interest in Man of to-morrow.

Three main considerations are occupying the more thoughtful minds. One is population. This does not affect the human race as a whole, as certain races are increasing satisfactorily, and to those that are not, including our own, the penalty—death—is at least known.

Mars will probably help in a material way in the race suicide, but there seems little hope that anything can be done about that.

The third factor—the consideration of which justifies these remarks in a food journal—has not long been realised, but constitutes, nevertheless, the most serious menace to our continued existence. G. V. Jacks, in an article in the *Daily Telegraph*, warns us against the danger of erosion.

Erosion on five continents (he says) may mean food shortage. Due to erosion, the task of agricultural science over half the world is not to make two blades of grass grow where one grew before, but to make one blade grow where a thousand grew before, and, when it is grown, to keep it there.

In the United States, where soil erosion is becoming a dominant factor in national life, a recent survey showed that 110 million acres had been converted into desert by erosion, 150 million had lost more than three-quarters, and 900 million acres a quarter to three-quarters of the entire soil.

We hate jeremiads, but they may be useful in compelling mankind to take stock. We also love our fellow-men, but the thought inevitably comes to us that perhaps Man is not the last word. He may, like bacteria in certain media, be in process of extermination by the products of his own growth.

Perchance, future evolution will proceed from quite a different stem—it is equally reasonable to visualize a being branching off, say, from the ant or the bird. Whether or not it would be a pity depends on the point of view. At all events, it is very evident that if the present generation of mankind is really interested in future generations the problem of preparing a place for them is one which needs tackling without delay.

Fitter Britain

There can be no doubt but that we are entering upon an epoch of most serious endeavour towards national fitness, and it is instructive to note that this is being tackled from many angles.

The Government campaign, inaugurated by the Prime Minister on September 30, is an intensive one which the Government and the Central Council for Health Education are to carry on for the next six months. It will include maternity and child welfare services; ante-natal clinics; school medical and dental services; milk in school; war on tuberculosis and other diseases; and, finally, a drive by the National Advisory Council for Physical Fitness. That the dry bones of co-ordinated effort are stirring is manifested by the somewhat unexpected move taken by the British Medical Association and recently broadcast in the daily Press. The ultimate aims and objects of the British Medical Association and the Government are the same. The dissemination of the knowledge of the multitudinous ways of obtaining fitness by curative and preventive methods cannot be better advised upon than by the members of the medical profession as a whole.

It is the opinion of the Association that all the services should be co-ordinated in one comprehensive scheme based upon the family doctor, whom no individual and no communal health service can replace. The British Medical Association's plans include intensive propaganda, and Mr. A. W. Haslett, late Scientific Correspondent of the *Morning Post*, has been appointed Public Relations Officer, and is entering upon his duties immediately.

Information and propaganda concerning such overwhelmingly important matters as pure milk supply, unadulterated foods, will probably be disseminated by national advertising.

With such valuable auxiliaries and backing, the family doctor, upon whom the service primarily rests, will be in relation with every hospital in his area and with every medical service provided. Jealousy or rivalry between private practitioners and the doctors connected with the various services should thus be eliminated.

Certain legislation is required for the proposed extensions, mainly for incorporating various schemes with the National Health Insurance system.

Pasteurisation

Pasteurisation is still a subject which vexes its supporters and opponents. Many of the arguments pro and con demonstrate a sad absence of the scientific method, even on the part of the scientists.

The tuberculosis argument is hotly contested. From an enormous amount of writing on the subject, it emerges that in the opinion of the anti-pasteuriser the presence in raw milk of the Koch's bacillus is counterbalanced by the retention of such elements as calcium, phosphorus, iodine, and even fluorine, and the vitamin C, on the assumption that such elements and vitamin confer immunity. A very plausible argument, if indeed pasteurisation actually does destroy or eliminate such materials. The ubiquity of the tubercle bacillus is such that it would kill off the race if infection were effective in every case, and it is rendered innocuous by sterilisation. But even the opponents of pasteurisation demand a cow population free from tuberculosis. For the most part they ignore undulant fever and other ills.

The maintenance of a cow population free from all diseases savours of Utopia—and in the meantime what should be done?

Statistics are proverbially prone to prove anything, and the use of children as "laboratory animals" has left much to be desired. There are too many disturbing factors, at any rate in experiments made up-to-date.

The latest experiments on rats, carried out by the National Institute for Research in Dairying (University of Reading) and the Rowett Research Institute, Bucksburn, Aberdeen, tend to demonstrate that pasteurisation does not produce the profound changes attributed to it by its opponents, especially from the point of view of calcium, phosphorus, and protein. There admittedly remains the duplication of these experiments, with children as their subjects. This is difficult, but not impossible. But it is a little difficult to imagine a set of children being submitted to treatment which might prejudice their health irrevocably (as would conceivably happen were they given raw milk, which might contain tuberculosis and other pathogenic organisms), especially if the pro-pasteurisers are right.

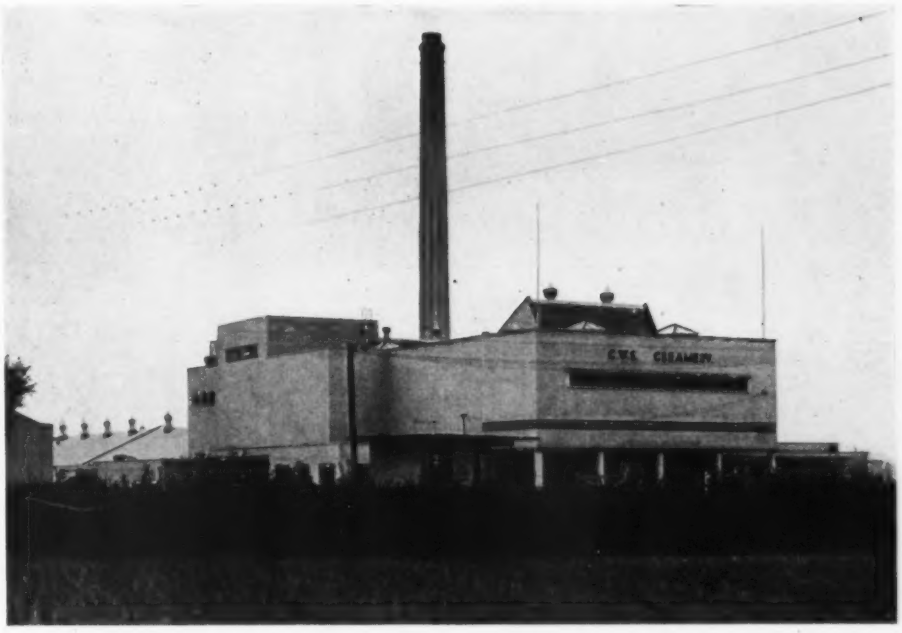
In view of the way the doctors disagree on this subject, and on the balance of evidence, we feel strongly in favour of pasteurisation (pending the Utopian epoch of perfectly healthy cows and strict scientific control of same), with the proviso that due effort be made to replace the hypothetical loss of minerals, vitamins, and possibly the halogens, by recourse to other substances—naturally occurring, if possible; if not, synthetic, at any rate until everybody is satisfied that the mineral salts, etc., are not modified to the extent alleged by the opponents of pasteurisation.

MODERN MILK PRODUCTION

A Description of the C.W.S. Creamery, Cerney Wick, Wilts.

★

By
T. Crosbie-Walsh
F.I.C.



1. The creamery stands in a vast expanse of typical Wiltshire meadowland. (*F.M. photo.*)

ON THE borders of Cricklade, in a perfect setting of the English countryside, stands the Co-operative Wholesale Society's fine creamery building. One of the first of the Society's milk canning factories, it started work in November, 1935, and has been in full production, without a break, ever since.

Products Handled

Five different products are made at the factory: brine-cooled milk despatched in bulk for handling in London; pasteurised bottled milk; canned unsweetened evaporated milk; sweetened condensed skim-milk; and canned cream.

Bulk Milk

Large quantities of milk pass through the factory (which serves as a collection station in this case) for transmission to London, where it is handled by the C.W.S. depots. On arrival at Cricklade, the milk is promptly cooled by means of open-type tubular coolers, and reduced to a temperature of 37° F. It is then sent by road in modern glass-lined or stainless steel milk tankers to the various destinations.

Sources of Supply

If lines are drawn on the map from Swindon to Malmesbury, from Malmesbury to Birdlip, from Birdlip to Fairford, and from Fairford to Swindon, the space enclosed by such lines will represent the area from which milk supplies are drawn by the Cricklade factory.

Bottled Pasteurised Milk

The milk enters the factory and is delivered into the weighing tanks. It is then pumped to the upper floor into the large capacity receiving-tanks from whence it enters the preheaters. The preheating process is a very important one. It is essential that the temperature of the milk does not exceed the legal maximum, or fall below the legal minimum. The thermostatic control works to within $\frac{1}{2}$° F. Charts are produced during the operation and an inspection of these demonstrates the perfection of the system adopted.

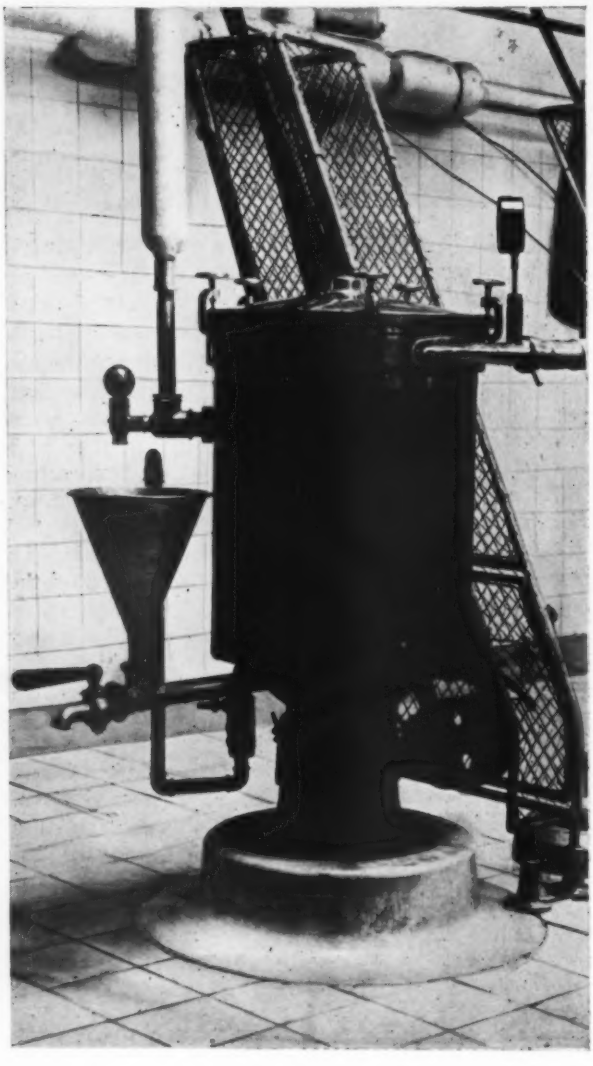
Filtration is next effected by means of a power clarifier. This clarifier, which extracts the visible dirt, epithelial cells and the slime from the milk by centrifugal force, operates at 2,000 revolutions per minute.

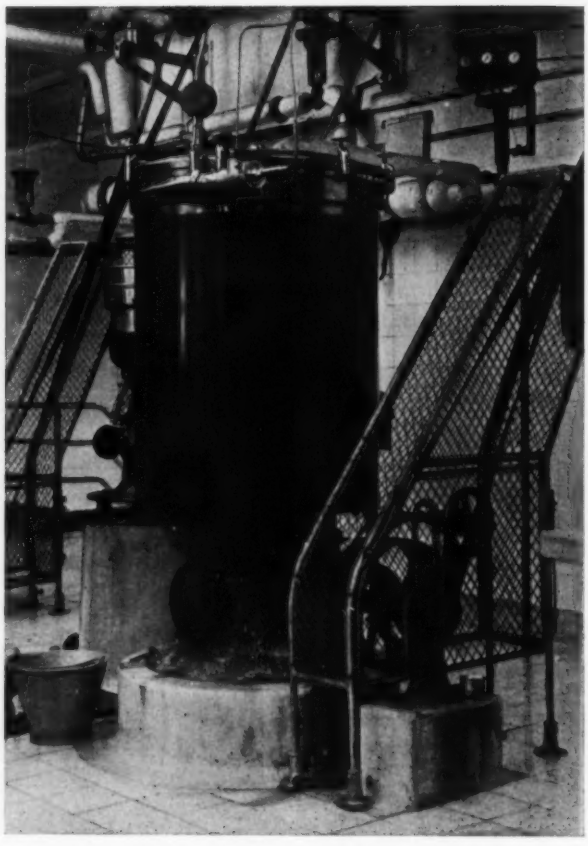
From the filter, the milk enters the "Wheatsheaf" holder, an item of pasteurisation plant designed and manufactured in the Society's engineering workshops. The holder is divided into four compartments and the cycles of filling, holding, and discharging are controlled automatically. The plant is so designed as to guard against any drop of temperature by means of thermostatic control. From the holder, the milk is cooled at once to 37° F.

The cooled milk is now ready for bottling. The plant used for this is a combined bottle washer and filler. The empty bottles are fed into the machine, in which

2 (above). One of the tankers by which fresh milk is delivered by road to C.W.S. depots in London.

3 (below). The preheater in the pasteurising section. Temperature is regulated within ½° F. *(F.M. photo.)*





4. After preheating, the milk goes through the filter. *(F M. photo.)*

they are washed alternately with water, detergent, and again water. Constant control is exercised over the efficacy of the bottle-washing operation, bacteriological tests being applied. The milk is filled into the clean bottles and closed with the usual cardboard cap in the same machine, which delivers them into cases, which are transported either to the cool store or direct to the waiting lorries by means of gravity conveyors.

The Cricklade factory is working under licence from the Ministry of Health, which ensures independent control, apart from the very strict control exercised by the factory organisation itself.

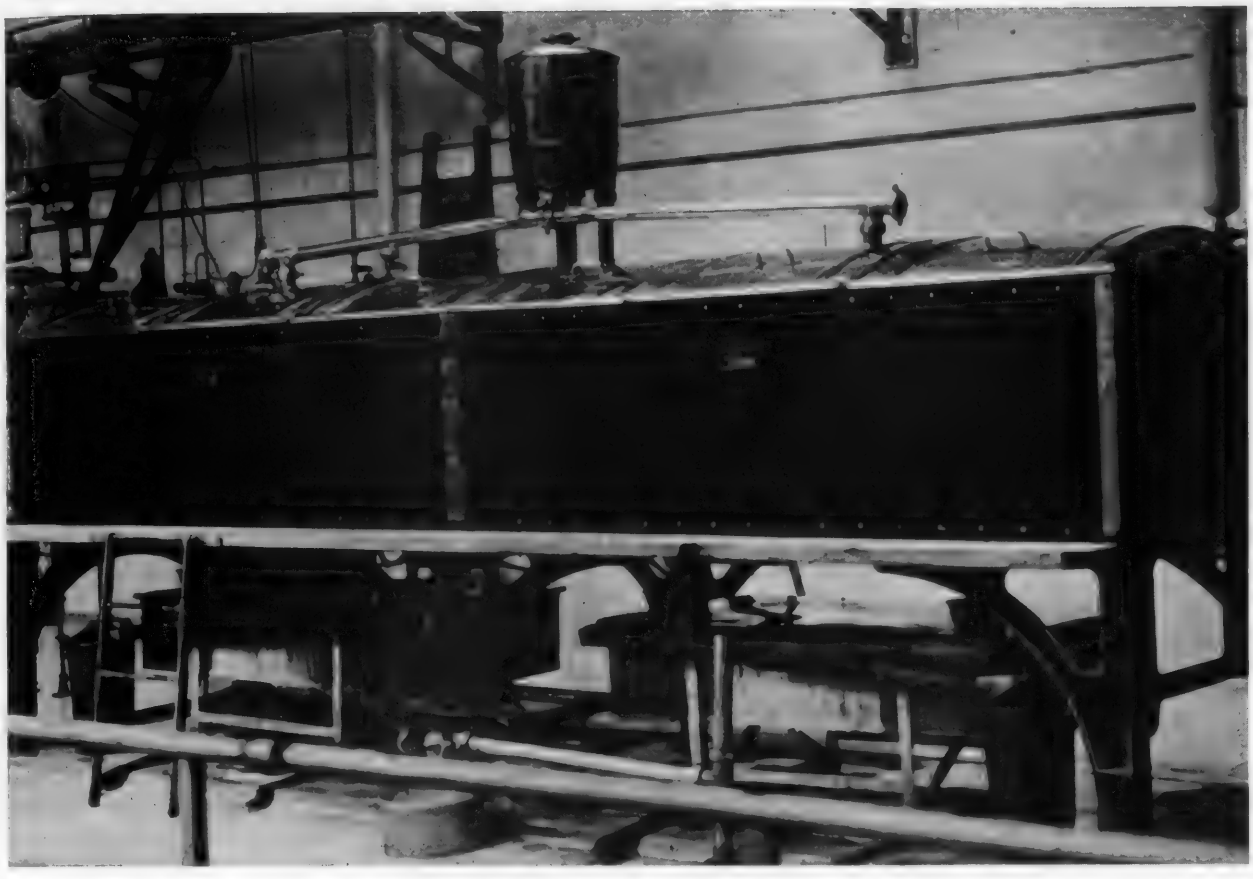
One of the objections voiced against pasteurisation is that the operations may not be properly carried out. No such criticism could be levelled at the Cricklade plant, highly controlled as it is with its minute-to-minute charted records and bacteriological control.

The markets for the bottled milk are Cheltenham and Gloucester Societies and schools.

Canned Unsweetened Evaporated Milk

The milk destined for this product is condensed *in vacuo* at the rate of about two-and-a-half parts of fresh milk to one part of condensed milk. It has the consistency of thin cream and is put up in two sizes in the Cricklade factory, equivalent to 2 pints and ¾ pint of fresh milk.

The incoming milk is discharged into weigh tanks,



5. The "Wheatsheaf" holder in the pasteurising plant. This holder is thermostatically controlled, and was designed in the Society's own workshops. (*F.M. photo.*)

where it is inspected and sampled. This inspection before manufacture is an important item. Observed by skilled operatives, the taste and smell are valuable indications of quality. Rapid laboratory tests supplement preliminary observations and these consist of the acid, alcohol, and phosphate tests.

Having satisfactorily passed this inspection, the filtered milk is weighed, sampled, and cooled. The cooled milk is collected in the standardising tanks, in which it is adjusted as to its fat and solids-not-fat contents, in order that the final product shall have the required composition.

Preheating

Preheating is the next operation. This is also an important one, as the viscosity and heat stability of the product are determined by the way it is carried out. What is aimed at is maximum heat stability compatible with satisfactory viscosity in the finished product. There is a certain incompatibility between these two attributes; that is to say, temperatures of preheating above boiling point give maximum stability but viscosity is sacrificed and there is a tendency for the milk to darken during subsequent operations.

In general, preheating is adjusted according to the character of the milk received, which varies with the seasons and weather conditions.

6. Milk coolers in operation in the pasteurising section. (*F.M. photo.*)

7. One of the milk evaporators. (*F.M. photo.*)

Evaporation

This is carried out in glass-lined vacuum pans with an evaporative capacity of approximately 750 gallons per hour. The continuous system is used. This has been found in actual practice to be better in every way than the batch system of evaporation. The milk is fed into the evaporator and evaporation proceeds in the usual way until the quantity reaches the operating level, at the required density. Thereafter, the milk intake and milk withdrawal is adjusted to the rate of evaporation. The withdrawal pipe is equipped with a by-pass, by means of which, if the milk being discharged is of insufficient density, it may be returned to the evaporator. There is installed a continuous density tester in which a hydrometer indicates the specific gravity. The operating level is maintained by adjusting the milk intake.

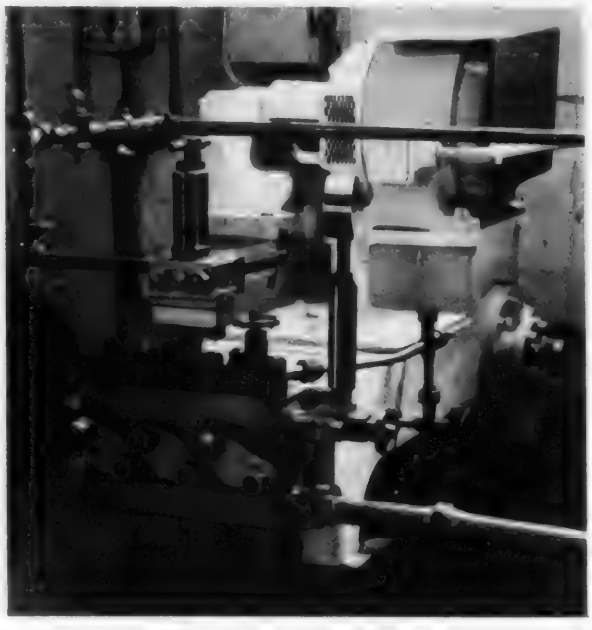
Homogenising

Homogenising overcomes the separation of fat from the finished milk. The process consists of forcing the milk through very fine apertures at high pressure. The high velocity of the milk and the sudden release of the pressure smashes the fat globules into much smaller ones, which have not sufficient buoyancy to rise to the top of the milk. Homogenising also increases the specific gravity of the fat globules.

In the Cricklade factory, the pressure and temperature at which homogenising is carried out are such as to ensure that the heat stability is not adversely affected.

The milk pumped from the homogeniser is cooled and conducted into storage tanks, from which it goes to the filling machines.

The larger cans correspond to a quart of fresh full-cream milk, whilst the smaller ones represent ¼ pint. The cans used are the open top type and are filled at the rate of seventy per minute. From the filling machines the cans run to the closing machines, which are fully automatic double-seamers.



8. Homogeniser. (*F.M. photo.*)

Sterilising

Two types of sterilisers are used, the "batch" and the "continuous" type.

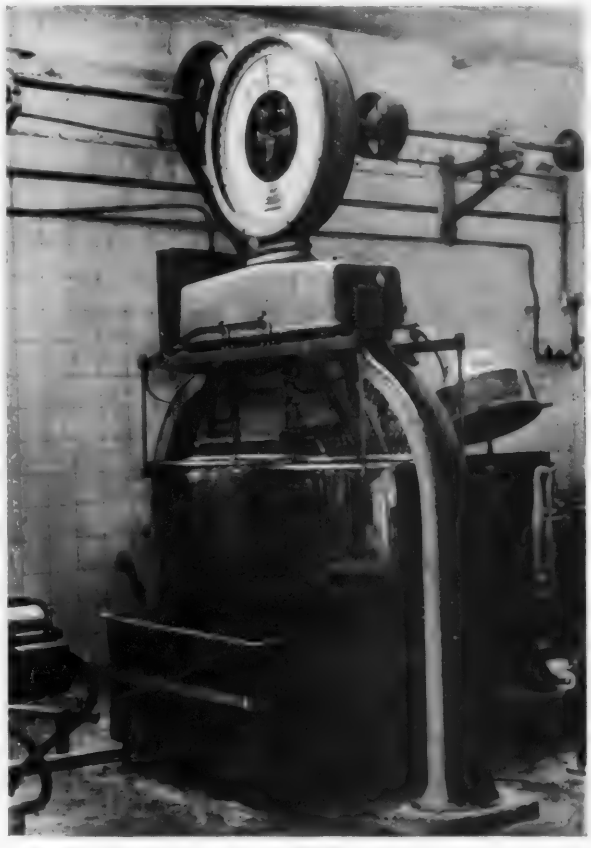
The batch steriliser is in the form of a cylinder, open at both ends. At one end the cans enter and at the other they are discharged. Inside the steriliser is a revolving cage which holds the cans. During the sterilising operation the cans are constantly rotated, thus avoiding the possibility of the drying of the milk on the side of the can, where the air space is. The cans are placed in trays, which are slid into the interior cage of the steriliser. The cans, after the required period of cooking, are cooled under pressure in the steriliser and discharged for drying and storage.

The ¼ pint size cans are sterilised by the continuous process, by means of a fully automatic pressure retort. This retort embodies a series of conveyors, mounted vertically on a closed circuit, which are made to rotate within the retort. The great possibilities of the continuous method of sterilising have been developed at Cricklade with economy of steam and labour.

Cooling, Drying and Labelling

From the steriliser the cans are automatically conducted to the cooling tunnel. This is composed of trunking, through which the cans are conveyed. The tunnel is supplied with moisture-saturated air, which is the cooling agent. The maximum amount of heat is absorbed from the cans and transformed into the latent heat of the steam formed. At the end of the cooler, forming part of the unit, is the dryer, from which the cans emerge cooled and dried and are carried by the conveyor's belt to the store.

After an appreciable period in the store, labelling is done automatically, and finally the cans are packed in fibre-board cases. These cases are printed with a particularly attractive and attention-compelling design.



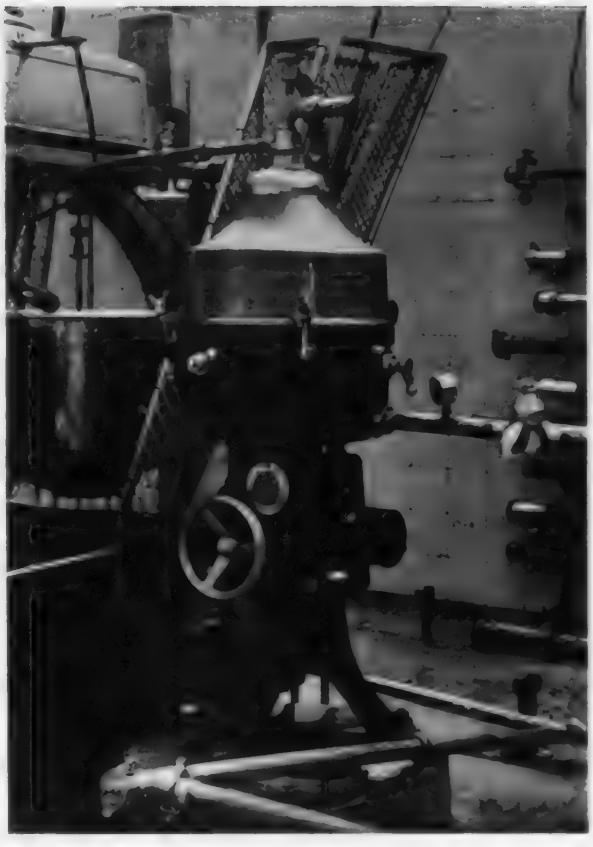
9. Cream weigher. (*F.M. photo.*)

Sweetened Condensed Skim-Milk

The skim-milk that constitutes the by-product from cream making is used for this product.

The skim-milk is treated in the first stages much as is that used for unsweetened evaporated milk, except that evaporation is carried out by the batch system. Prior to its entering the evaporator, it is mixed with the requisite proportions of sugar. Scott's method of cooling by vacuum is used.

The milk is finished in the condensing plant at such a point that it contains certain excess of moisture; the temperature is about 140° F. A vacuum is raised on one of the coolers and the moment the batch is struck



10. Cream separator. (*F.M. photo.*)

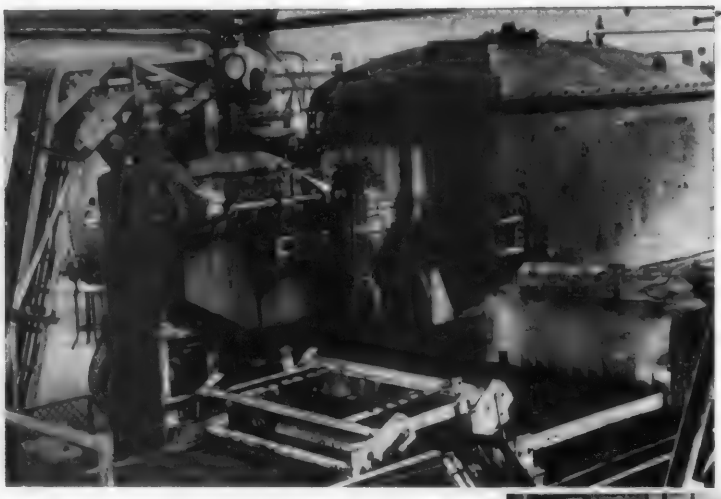
in the condenser the vacuum there is broken and the whole batch of milk drawn into the cooler. This takes a matter of a few minutes only.

The cooler is then closed and the vacuum is progressively increased on the cooler. As the vacuum increases, the temperature of the milk decreases by the evolution of water vapour. The vacuum is under very complete control and it is thus possible to control the cooling gradient so that during the forced crystallisation period the temperature may be maintained constant. As soon as this holding period has been completed the final cooling is carried out as quickly as is possible with the vacuum-producing arrangements available.

The cooler itself consists essentially of a glass-lined or stainless steel vessel with a stirrer in the centre. There are no coils or jackets in contact with the milk and there is therefore no risk of the formation of a film of super-cooled milk on the shell which would have to be removed by scrapers. The milk is processed in the absence of air and the product when completed is in a de-aerated condition.

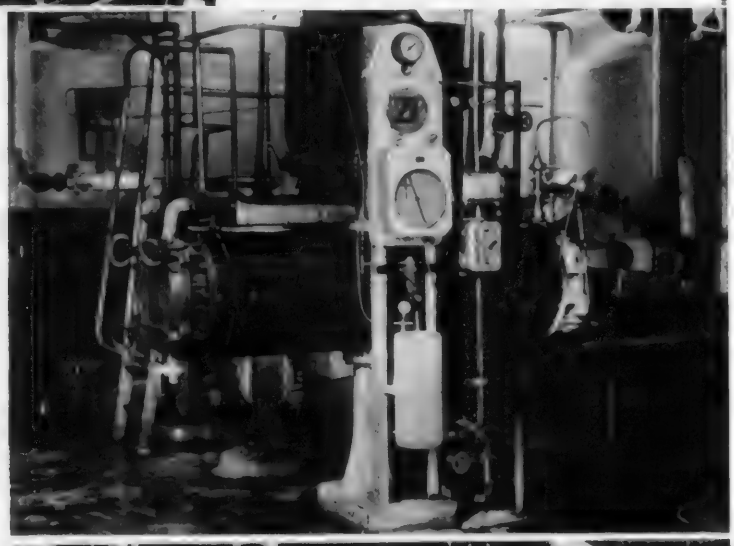
The vacuum-producing equipment consists of a set of triple steam jets with surface condensers. The first of these condensers comes into operation only during the final stages of the cooling, during which period brine is used as a refrigerant. The two other condensers operate on water.

The steam jets used are of the mixed-pressure type, using both high and low pressure.



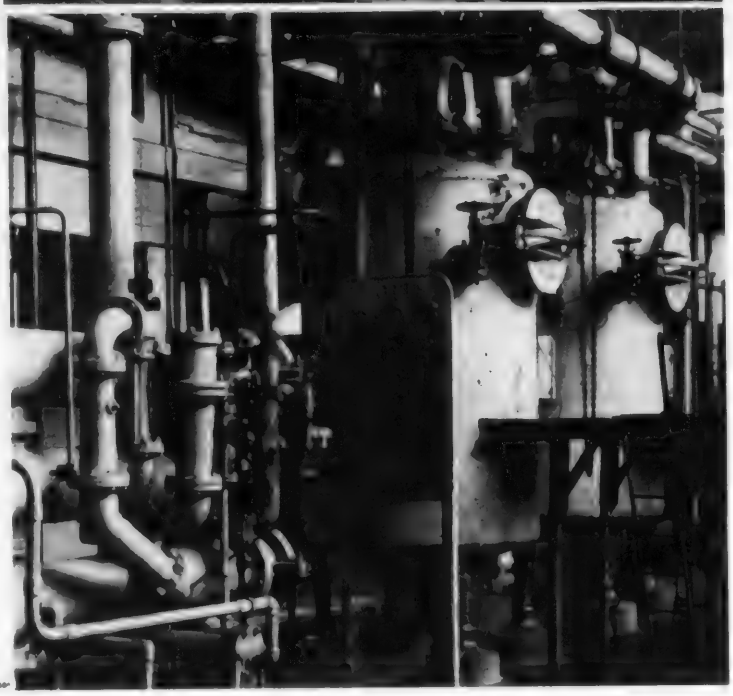
11 (left). L.C. automatic pressure cooker. On the left is the inclined conveyor by which the cans enter the cooker, and on the right of the picture may be seen the entrance to the cooling tunnel. (*F.M. photo.*)

12 (below). Preheater in the unsweetened milk section. (*F.M. photo.*)



13 (above). Can fillers and seamers. (*F.M. photo.*)

14 (right). Vacuum coolers for sweetened skim-milk. (*F.M. photo.*)



15. A pair of L.C. automatic pressure cookers with the cooling tunnel in the middle. (*F.M. photo.*)

Canned Cream

The operations involved in the preparation of cream for canning are much the same as those for milk. The cream is separated, standardised, preheated, homogenised, and cooled. Sterilisation is by batch and continuous methods.

Chemical Control

A strict control is exercised upon all milk supplied to the factory. The Reductase test is applied to all samples. The organisms of milk have the property of destroying the colour of methylene-blue. 10 c.c. of the milk is placed in a graduated tube and 1 c.c. of methylene-blue solution added. The tubes are incubated at 98° F. The time required for the complete decolorisation of the milk is noted. The usual grading is as follows:

Grade 1. *Good Milk.*—Not decolorised in five hours.

Grade 2. *Fair Milk.*—Decolorised in five hours but not in less than two hours.

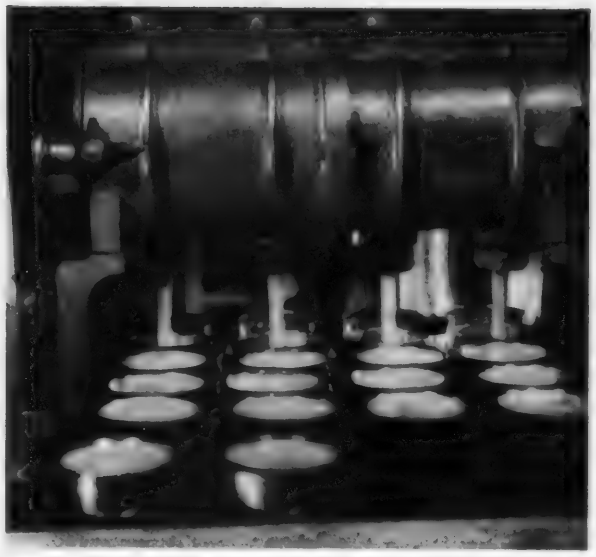
Grade 3. *Bad Milk.*—Decolorised in less than two hours.

Grade 4. *Very Bad Milk.*—Decolorised in less than twenty minutes.

For routine fat is estimated by means of the Gerber method and lactometer reading and the fat percentage, using a "Richmond" scale rule.

Apart from the internal laboratory control, samples are constantly taken by the Local Authorities, acting under instructions from the Ministry of Health.

In the extensive London laboratories of the Society not only control work but constant research is conducted,



16. Filling cans with cream.

with a view to constant improvement of methods in the factory.

The production of evaporated milk, simple as it may appear from a general description, is beset with many manufacturing problems. Slight variations in the time and temperature of preheating, sterilising, the temperature and pressure used in homogenising have, as has been mentioned, great influence on the physical properties of the finished product. Raw milk, in itself, is not a substance of fixed composition. Climatic conditions, the season of the year, the breed of cow and a dozen other factors all contribute to the characteristics of the raw milk. Apart from the meticulous control of the quality of the material entering the factory and its standardisation to fixed legal standards, the perishable nature of milk renders it necessary that the operations be keyed up to the highest pitch of efficiency. Breakdowns of any item of plant must be reduced to a minimum and rapid repairs effected. There is a relentless flow of milk which must be securely closed into tins in the least possible time, after having been subjected to a complicated series of treatments, every one of which, if not efficiently conducted, would lead to serious loss.

Suppliers of Plant and Equipment to the C.W.S. Creamery were as follows:

Combined Bottle Washer and Filler: *Dawson Bros., Ltd.*
Automatic Weigher: *W. and T. Avery, Ltd.*
Standardisation Tanks: *Robert Jenkins and Co., Ltd. (Rotherham).*
Control Instruments: *Short and Mason, Ltd.*
Continuous Vacuum Evaporation Plant: *George Scott and Son (London), Ltd.*
Homogenisers: *G. and J. Weir, Ltd.*
Can Fillers: *Mather and Platt, Ltd.; Anderson and Jansen.*
Cans: *Metal Box Co., Ltd.*
Double Seamers: *Metal Box Co., Ltd.*
Batch Steriliser: *J. Fraser and Son, Ltd.*
Automatic Retorts: *L.C. Engineering Supplies, Ltd.*
Labelling Machines: *Beth Label and Wrapper Machines, Ltd.*
Cartons: *Hugh Stevenson and Sons, Ltd.*
Milk Cleaning Machine: *Titan, Ltd.*

ELEVENTH WORLD'S DAIRY CONGRESS

By a delegate

GERMANY acted as host for the Eleventh World's Dairy Congress, which was held in Berlin this year on August 22-27. The Dairy Congress has assumed vast and, it is feared, almost unwieldy proportions, since it undertook the huge task of satisfying the demands of over 3,700 members and the discussion of the subject matter of 414 papers in the conference section at this meeting.

These Dairy Congresses are held approximately triennially under the auspices of the International Dairy Federation. By consultation with various authorities of the country acting as host to the Congress, the business of the Congress is mapped out in skeleton, and the main organisation work is left to an executive body selected by that country. Germany, this year, organised an excellent conference and a series of valuable excursions and study trips, as well as an international butter competition and a machinery and accessory exhibition. The organisation called for our highest praise and the lavish hospitality of the Germans evokes our gratitude.

For purposes of description, the Congress activities may be divided into three parts: the conference, or the ordinary business and paper-reading section, the excursions and the exhibition.

The Conference

The business of the conference was divided into four sections: milk production, dairy herd management, and tropical dairying; the composition of milk, defective milk, the manufacture of by-products; legislation, marketing, education; dairy machinery and technical problems. Each section was divided into topics, there being twenty-one topics in all. The papers submitted on each topic were collected and summarised. The section business then consisted of hearing these reports, which was followed by an all-too-short discussion, each topic being disposed of in ninety minutes. One novelty worthy of mention was the use in the conference rooms of headphones and receiver for each member, so that if, for instance, a report was being delivered in German, by the use of the phones the speech could be heard almost simultaneously in one of the two other official languages, French or English.

Milk Production

Section I. dealt with researches into the feeding of dairy cattle such as the protein level of the ration for production and the use of home-grown foods. The latter topic gave members a taste of the German campaign of self-sufficiency. The securing of abundant protein for winter consumption would be met by growing plenty of leguminous fodder and the careful storage of the properties of fresh grass by ensilage. The depredations into dairy herd efficiency by various diseases such as mastitis, contagious abortion, and tuberculosis are of universal occurrence, and modern methods of control and eradication were discussed. In the report on tropical dairying, attention was drawn to the lack of balance between population intensity and the amount of dairy production when comparing tropical and temperate zones.

Milk Composition and Behaviour

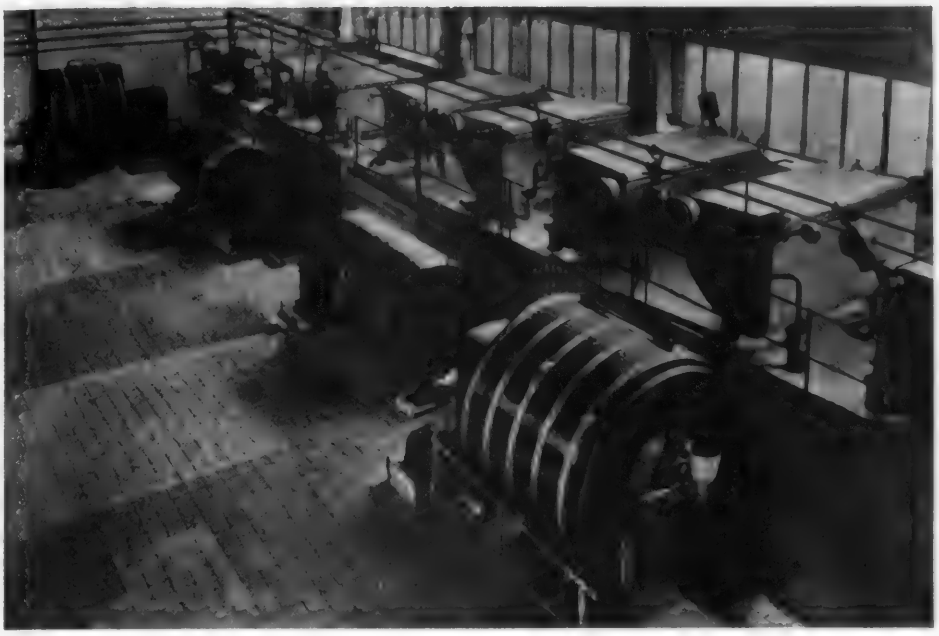
Section II., which dealt with various aspects of milk processing and treatment, with improvement of quality in view, discussed the composition of defective milk, taints, the pasteurisation of milk for cheese-making, the utilisation of surplus milk, skim-milk, and whey by condensing and drying, the keeping quality and the development of the aroma of butter and methods adopted for the improvement of the quality of milk and its products.

The occurrence, and the conditions leading to the production, of milk of defective composition and abnormal behaviour were fully discussed. The effects of udder infections, end of lactation, drought and the individual characteristics of some cows in giving milk of a low content of solids-not-fat were described. Examples of the effect of food, such as oat hulls, producing milk which did not ferment normally in cheese manufacture were brought forward. With regard to the pasteurisation of milk for cheese-making, it was agreed that provided the heat treatment did not interfere with the creaming properties, the rennetting properties would not be impaired, the creaming test acting as a reliable criterion. The results, however, are quoted mostly for the manufacture of some Continental varieties which account for only a small proportion of the world's cheese output. Reports were given that Cheddar Cheese uniformly graded higher when made from mildly pasteurised milk. Too high temperatures impair the flavour and body of cheese and retard ripening.

No new experiences or information were forthcoming in the discussion on the drying and condensing of surplus milk, skim milk, and whey. The most important point is to find an avenue for these products in other branches of the food industry such as the baking and confectionery industries. In the past, milk products have not increased in sales in these industries at the desired rate, and fluctuations in demand of milk in an ever-increasing milk market has delayed the progress of the utilisation of surplus milk and other liquid by-products.

Testing Methods

For the hygienic control of market milk, it was stressed that the methods of carrying out the tests should be



Delegates were given an opportunity to see the German dairy industry in operation, and to compare German methods with those in their own countries. Picture shows the butter-making plant in a large dairy in Nuremburg.

(*Photo: Grimm.*)

standardised for all laboratories. Although at first sight there does not seem to be a demand for the same rigidity of milk examination for various manufacturing purposes —*e.g.*, for cheese or dried milk—yet, in the long run, it will be felt that the quality and storage properties of any manufactured product depend on starting with milk of good hygienic quality. Methods of bacteriological testing of milk were again added to, and tests for efficient pasteurisation, such as the phosphatase test, tests for added water and for the neutralisation of milk, and the freezing-point determination were discussed.

With regard to the keeping quality of storage butter, the parts played by bacteria, moulds, and fat oxidation in shortening the storage period were adequately realised, although it is feared that the mechanism of fat deterioration was speculated on too much. The property of the butter fat of cream dissolving lactic acid during the setting period and the effect of that acidity on the storage qualities has yet to be driven home, although the subject of "organic acidity" of the butter fat was mentioned in one paper. Workers agree closely on the causative compound, the mechanism of development, and the fate of the aroma-producing constituent of butter. They agreed very well also in the amount of diacetyl found in butter made from ripened cream. It was resolved to use Barnicoat's method in future as a standard for the determination of diacetyl in butter and cream cultures (*Analyst*, 1935, **60**, 653-662).

Sale of Milk and its Products

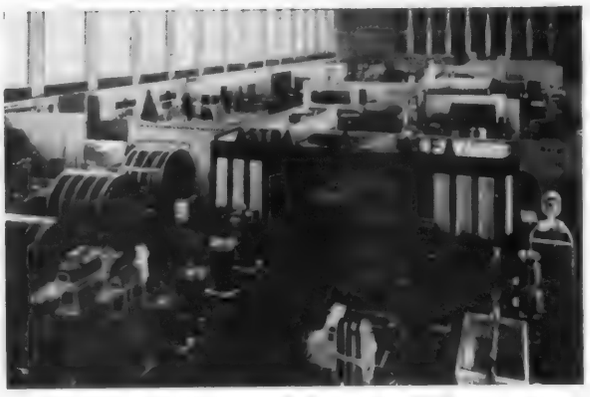
One of the important topics in Section III. was the report of the International Dairy Federation on the manufacture, standards of composition, and the methods of analysis of processed cheese and milk powder. It was recommended that there should be only one designation for *processed cheese*, that the fat content, preferably that in the dry matter, should be reported, and that the amount of emulsifying salts should not exceed 3 per cent. *Milk powder*, made from whole and skim-milk only (not buttermilk and whey), should not contain more than 6 per cent. of moisture, not less than 24 per cent. of fat, should be designated as such or as *dried milk*, and the percentage of fat and the net weight shown on the label. The methods of analysis adopted were those of the Society of Public Analysts, Milk Products Sub-Committee.

The results of a questionnaire on the methods employed to improve the hygienic production of milk in different countries were discussed. It was realised that the point now reached was to aim at the production of milk easy to pasteurise, *i.e.* clean milk, free from thermophiles, which would be rendered free from pathogenic organisms and have its keeping quality raised to a satisfactory degree by pasteurisation.

The discussion of the nutritive value of milk did not obtain the support or attention that this important topic deserves. More attention was paid to movements to encourage milk consumption than to physiological and other experiments which would back up this claim. It is true that there were some valuable papers dealing with the nutritive value of raw and heated milks and on the vitamin content of milk. In the discussion, it is feared that a wrong impression had been given as to the effect of heat on milk, when one speaker took it that boiling destroyed most of the specific nutritive properties. Another speaker, however, cleared the air by quoting figures which illustrated the small loss in value which milk suffered by being sterilised at 220° F. for twenty minutes.

Technical Dairy Problems and Dairy Machinery

The disposal of dairy waste waters was discussed at length. One English worker reported his experience of dairy sewage disposal by percolating filters and by the



A view of the machinery hall at the Exhibition, which was held at Witzleben.

activated sludge process. The pre-precipitation of protein by copper salts or chrome alum before ordinary treatment was also mentioned. The handling and transportation of milk and arrangements in factories for the manufacture of containers for packaging milk and milk products were discussed. Economy in power requirements in dairy plants came in for much discussion, especially in regard to the flexibility of electrical power and the value of calculating the cost of power over long periods in order to obtain reliable figures for average consumption. Progress in the development of dairy machinery and utensils and the use of modern alloys in dairy plant was also reported on.

Excursions

During the afternoons following the paper-reading meetings in the morning, short excursions were available to farms, dairies, research institutes, produce storage and distributing centres and other places of interest around Berlin. The municipal sewage farm provided a means of disposing of part of the settled sewage by land irrigation and of running a herd of cows which supplied milk at a low price to schools and municipal institutions. There was little, if any, holder pasteurisation done in the city processing plants, and generally speaking their plant was inferior to that used in London depots and work was done on a smaller scale. Hygienic methods of farm milk production could also be improved. A large dairy product storage and distributing centre in the heart of Berlin showed the magnitude of one of the co-operative retail distribution methods and the control of quality of the goods.

After the Conference, two-day excursions to districts in North and South Germany were made by members. These afforded a wider experience of farming, cattle breeding, and methods of milk production, and opportunities to visit schools and research institutes were given. After these tours, long-period excursions further afield into Germany were available, where dairying in Bavaria and the Rhineland could be examined. These afforded pictures of the magnitude and variety of the German dairying industry. The research institutes were well staffed and equipped and carried out an enormous volume of control, teaching, advisory and research work. Machinery testing is also very efficiently carried out and every new type of machine is thoroughly tested before it is exploited commercially.

The Exhibition

This was held in the new Exhibition Grounds at Witzleben and was housed in five magnificent halls. It is doubtful whether the machinery exhibitors had ever experienced such an appropriate setting for their material. The main themes of the plant section were: high temperature short-time plate pasteurisers and similar heat exchangers, small and large refrigerating units, the use of electrical power for transport and the factory, the extended use of aluminium and of stainless steel in plant manufacture, butter churns and cream separators, glass piping and glass-lined ware and laboratory equipment. This section was a great success and a considerable volume of local and international business was transacted.

International butter competitions were held for the first time, there being classes for fresh and for storage butter. Each sample was judged by an international panel of six graders of repute. The competitive exhibits were housed in refrigerated glass cases in full view of customers and were tasted by interested visitors until the closing day. The exhibits of cheese, both in the cheese section and in the stands of various countries, were comprehensive and instructive.

Another hall was given up to stands set up by various countries, which illustrated the progress of the dairy industry in that country and the means adopted for dairy education and increasing the consumption of milk and its products. Another hall depicted the part played by dairy in ancient and modern art. The hall reserved for Germany showed the strides made by that country in the last ten years in the organisation of its dairying industry and in the way it attempts to convince its people of the nutritive value of milk products. The romance around the Bavarian peasant and the part he plays in the dairy industry were very much in evidence.

The Congress had other valuable assets. It gave an opportunity for people studying the same topics to meet and discuss matters further. The willingness of the dairy industry to probe into and discuss its problems in international congresses is perhaps the greatest indication of advancement on its part.

Canned Mangoes

A BIG drive is being made to popularise Indian mangoes in other parts of the world. A Bombay firm reports that preliminary experiments have been encouraging, and that orders for 15,000,000 tins have already been received from England. Full-scale production will be started next season.

AMERICAN CHEMICAL SOCIETY

Abstracts of Papers read at the Meeting of the Society in Rochester, N.Y., from September 6 to 10, 1937

The Blood Pigments of Cured Meats. I. Preparation of Nitrosohæmoglobin and Stability of the Compound. *W. M. Urbain and L. B. Jensen, Swift and Company, Chicago, Illinois.*

Cured meat pigments differ from those of "fresh" meats in their stability towards heat. This paper is the first of a series on a study of the preparation and properties of these cured pigments and the conditions under which they are and are not formed in the curing process.

A method of preparing oxyhæmoglobin in solution from hog's blood is described. This solution is checked by an adapted Van Slyke-Neill method for oxygen capacity and by a spectrophotometric method to determine its freedom from methæmoglobin. From this oxyhæmoglobin solution is prepared nitrosohæmoglobin by action of nitric oxide on reduced hæmoglobin in the absence of air. This is done in a special apparatus, details of which are given.

The absorption spectra for nitrosohæmoglobin and methæmoglobin are shown.

Nitrosohæmoglobin is found to be stable in the absence of oxygen. In the presence of oxygen it is rapidly converted (partially) to methæmoglobin. Some practical considerations of these results in connection with storage of cured meats are discussed in a preliminary way.

The Blood Pigments of Cured Meats. II. An Application of the Van Slyke-Neill Manometric Gas Apparatus to the Determination of the Hæmoglobin Content of Dilute Hæmoglobin Solutions. *W. M. Urbain, Swift and Company, Chicago, Illinois, and D. A. Greenwood, Institute of American Meat Packers, Chicago, Illinois.*

In the course of a study of colour changes occurring in meat during the curing process, it became necessary to determine the concentration of hæmoglobin in dilute solutions. The object of this paper is twofold: First, to describe a technique of determining the concentration of hæmoglobin in dilute solutions using a modification of the Van Slyke-Neill manometric oxygen-capacity technique; secondly, to report the effect of time and micro-organisms on the oxygen capacity of dilute solutions.

The modified technique consists in diluting whole blood with distilled water at a given temperature and pressure. A correction for the amount of oxygen which physically dissolves at this temperature and pressure is made. A table is given showing the solubility of oxygen in distilled water at certain pertinent temperatures as determined by the Van Slyke-Neill method.

Concentrations of hæmoglobin in the same solutions were determined by the spectrophotometric method described by Drabkin and Austin. The results obtained by the two methods are in good agreement.

Data are also given to show that time and micro-organisms play an important rôle in causing a loss in oxygen capacity of dilute solutions. Dilute oxyhæmoglobin solutions can be kept for a month and longer without loss of oxygen capacity, provided that they are kept properly oxygenated at low temperatures and microbic action prevented by a substance like toluene.

Processing Edible Fats and Oils—A Review of the Art with Some Attendant Problems. *R. C. Newton, Swift and Company, Chicago, Illinois.*

The historical development of production and processing of food fats and oils with major emphasis on the newer technique is briefly reviewed.

The principles involved in extraction and rendering are discussed giving reasons for the selection of methods in use.

In addition to a short description of the conventional methods for refining and deodorising, there are discussed several new processes which have been offered to the industry and show some possibility.

Mention is made of the necessary treatments to induce special characteristics—*i.e.*, plasticity, emulsifiability, stability, etc.—that are required by the various users of these products.

Measurement of Freshness of Unbroken Eggs. *R. H. Carr, Purdue University, Lafayetta, Indiana.*

A study was made of unbroken eggs to determine their freshness as measured by a special form of a Jolly balance. It was found that there is only about 6 grm. difference in buoyancy between eggs old enough to float in water, and fresh ones. Hence, in order to detect small differences in changes of eggs, it is necessary to use a spring sensitive to 0·1 grm. or less. Eggs kept at the usual store temperature (25° C.) will lose 0·1 gm. or more per day, while those kept at refrigerator temperature (5·0° C) will lose about half this amount.

An effort was made to determine how the shell membrane combination, yolk and white, contribute to the buoyancy of fresh and stale eggs. It was noted that the weights of shells and yolks are most significant. In a normal size egg (57 gm.) the yolks are over half solid (10 gm.) and the shell and membrane will weigh 5 gm. or more when dried at 100° C. Such an egg would have a Jolly number of 63 or more—meaning 5 grm. over its floating weight when fresh and about half of that number after having been stored at room temperature for three weeks.

The Salt Content of Cured Ham. *R. C. Miller and P. T. Zeigler, The Pennsylvania State College.*

Analytical data are presented showing the salt content of hams cured by three different procedures:

1. Dry-curing, using 1 oz. per pound of meat, of a mixture of 8 lb. of salt, 3 lb. of sugar, and 3 oz. of saltpetre.
2. Brine-curing in a 75° (salometer) sweet pickle made up by dissolving the mixture used for dry-curing in 5 gal. of water.
3. Brine-curing in an 85° (salometer) sweet pickle made up by dissolving the mixture used for dry-curing in 4 gal. of water.

Data on these hams are compared with those obtained on a limited number of commercial hams. The centre cuts of the experimentally cured hams contained on the average approximately 10 per cent. of salt in the dry matter which was less by about 4 per cent. than that found in the commercial hams. No significant difference was apparent between the salt contents of the hams cured by the three procedures. The keeping qualities were good for all the hams.

The relationship of the salinity of the final product to the length of the curing period is discussed both for the dry-curing and the brine-curing procedures.

Some Biochemical Aspects of Soya Bean Oil. *A. A. Horvath, Agricultural Experiment Station, Newark, Delaware.*

Soya bean oil induces in the organism an unusual amount of activity, which may find an explanation in its peculiar electrical behaviour, as shown in the Dalliacqua test.

Refined soya bean oil differs from crude soya bean oil by being deprived of phosphatides, sterols, vitamins, and enzymes. Solvent extracted soya bean oil is richer in phosphatides and sterole than press oil, and contains vitamins A and E. An antihæmorrhagic agent was discovered in the soya bean, which was found to be associated with the oil of certain seeds, which was named "vitamin K". Recently a protective factor against nutritional encephalomalacia of chicks was discovered in the non-saponifiable fraction of certain oils, with soya bean oil heading the list.

Soya bean is rapidly oxidised on exposure to air and light, especially when the peroxidase of the soya bean seed is permitted to act upon it, resulting in the formation of peroxides, of toxic aldehydes and ketones, and in the destruction of vitamin A.

Piece of faulty cheese, showing gas-holes and cracks. (*F.M. Photo.*)

FAULTS in CHEESE

DUE TO MICRO-ORGANISMS

By J. W. Egdell, University of Bristol

THE MANUFACTURE of cheese is a biological process designed and controlled to produce a good curd having the desired body and texture, a palatable flavour and pleasing odour. To obtain these characteristics great skill is required on the part of the maker, but, even so, it is sometimes impossible to prevent the activity of undesirable micro-organisms, which are capable of causing physical defects and abnormal flavours and odours to the detriment of the cheese. The chief faults experienced can be conveniently classed in two groups, namely (*a*) body and texture defects, and (*b*) abnormal flavour and changes in colour.

Gas Production

The formation of gas-holes in cheese curd is one of the commonest faults met with during manufacture and ripening. Sometimes it is not noticed until late in ripening, but usually it is observed at a much earlier stage—even while the whey is still on the curd.

Investigators have shown that the production of gas is invariably due to the action of species of coli-aerogenes bacteria or to lactose-fermenting yeasts. In both instances, the causative organisms may be present in the milk when it reaches the dairy, but, of course, the factory plant, unless scrupulously cleansed, can be a prime source of contamination.

The wide range of temperature in which some members of the coli-aerogenes group of bacteria are capable of growth renders their control in cheese manufacture somewhat difficult, but the use of an active starter culture whereby relatively quick acid development is obtained is undoubtedly of major importance in checking their activity.

The writer has investigated cases where the bacteriological examination of the milk has revealed heavy contamination with those organisms, yet little or no gas resulted in the curd owing largely to the fact that the activity of the bacteria in question was restrained by rapid acid development. On the other hand, the use of a weak starter culture, with the subsequent slow production of acid development, may result in a curd permeated with gas-holes even though the initial contamination of the milk with gas-producers is not exceptionally abundant.

The production of gas due to yeasts can be differentiated readily from that due to coli-aerogenes bacteria. When caused by the former, the gas-holes in the cheese are elliptical in shape, and not spherical as is the case when coli-aerogenes bacteria are responsible. Although gassiness due to yeasts is not so common in ordinary factory practice, it is usually most serious when it does occur; often the texture of the curd is so spongy as to render the cheese totally unmarketable. The yeasts gain access to the milk from dirt and dust and may contaminate the factory to such an extent that all

equipment must be thoroughly washed and steam-sterilised, and the cheese room itself scrupulously cleansed, to overcome the trouble.

By employing a clean active starter culture, obtaining quick acid development, hastening the firming of the curd and removal of whey, and salting more liberally, yeasts and other gas-producing organisms can be suppressed to a great extent.

Slow Acid Development

This defect sometimes occurs during manufacture, when large amounts of moisture are retained in the curd, and results not only in a poor physical condition of the cheese but also in the production of off-flavours of a sour or bitter nature.

The causes are many and varied, but the use of an inactive starter culture is probably the most common. Investigators of this subject have recently shown that starter organisms may assume a phase when their ability to produce lactic acid from lactose is seriously impaired. Another cause of "slow working" is the presence in the milk of large numbers of organisms which have an inhibitory influence upon the action of the lactic acid bacteria.

Some difference of opinion still exists concerning the relation of mastitis infection in the dairy herd to "slow" cheese. Some strains of mastitis streptococci appear to have no adverse effect, but the writer has found that, in some cases of slow acid development, the withholding of milk from affected cows has resulted in normal "working" being restored.

Other instances of "slow" cheese investigated by the writer have been found to be due to milk heavily contaminated with proteolytic spore-forming bacteria. This is of particular importance where aged pasteurised milk is utilised for the making of cheese, because such sporing types of bacteria are not destroyed by the pasteurising process, and if the original raw milk contains relatively large numbers, or if the storage temperature of the pasteurised milk is not sufficiently low to prevent their subsequent growth, trouble of this nature is likely to occur.

Abnormal Flavours

Abnormal flavours in cheese can be caused by many species of micro-organisms. Very often the taint is difficult to perceive until the actual manufacture is nearing completion, when nothing can be done by way of remedy. Apart from coli-aerogenes bacteria and yeasts which produce, in addition to faulty texture, bitter and yeasty or sweet flavours respectively, other organisms, chiefly proteolytic types, which decompose the casein, are responsible for what may best be described as putrefactive flavours. Also, a variety of the true lactic acid bacteria, namely streptococci lactis maltigenes, which produces a caramel or burnt flavour, is occasionally a source of anxiety to the manufacturer. The only remedy for such taints is to attempt to suppress the action of the causative organisms by rendering the conditions unsuitable for their rapid functioning, but this is seldom practicable.

Colour Defects

Colour changes in cheese as a result of micro-organic activity consist primarily of the development of yellowish-red spots or patches due to bacteria, and to discoloration caused by the growth of moulds. Colour-producing organisms gain access to the milk from dairy equipment, and as the fault is not noticed until the cheese is several days old no remedy can be adopted. The control of mould growth, which appears mainly at the surface of the cheese, lies in the proper management during curing and the efficient ventilation of the ripening room.

Prevention

The manufacture of high grade cheese requires milk of good quality, bacteriologically. In this connection it must be emphasised that the type of organisms present is much more important than the actual number. Milk produced under clean sanitary conditions will contain a predominance of true lactic acid bacteria with possible undesirable species in a very definite minority.

An indication of the quality of farm milk supplies can be readily obtained at the dairy by inspection of the churns for the presence of taints, and the application of such rapid tests as the acidity determination, reductase, and fermentation tests. Milk having apparent defects should never be utilised for cheese-making, and if any doubt whatsoever exists as to the wholesomeness of supplies pasteurisation should be resorted to. This procedure destroys the majority of the gas-producers and many of the bacteria causing taints, but thermoduric organisms—*e.g.*, spore formers—if present, will remain viable, hence a pure active starter culture becomes more than ever indispensable in order to keep such organisms suppressed.

Lastly, strict cleanliness in the factory and expert management by the cheese maker is, at all times, essential for avoiding bacteriological deterioration of the product during manufacture and ripening.

Royal Sanitary Institute at Llandudno

A SESSIONAL Meeting of the Royal Sanitary Institute was held on Friday, October 1, in the Town Hall, Llandudno, when there were discussions on "Tuberculosis in Wales: a Stocktaking", opened by Dr. D. A. Powell, Principal Medical Officer of the King Edward VII. Welsh National Memorial Association, Cardiff, and on "The Conway Mussel Purification Tanks", opened by Dr. R. W. Dodgson, O.B.E., Director of the Ministry of Agriculture and Fisheries Shellfish Research Station, Conway. There was also a paper by Dr. D. E. Parry Pritchard, dealing with a recent outbreak of bacillary dysentery.

In connection with the meeting, there was a visit on the Saturday morning to the Ministry of Agriculture and Fisheries Experimental Research Station, Conway, for a demonstration and inspection of the purification tanks.

The Chair was taken by Dr. Charles Porter, a Vice-President of the Institute.

The Manufacture of

JELLY POWDERS

Modern methods discussed

By J. E. Thomas

THE JELLY powder obtainable by the public to-day bears little resemblance to that which, a few years ago, first appeared as a rival to the jelly tablet. All the more remarkable is its present position when it is realised that in many respects the powder represents a mixture of essentially incompatible substances. Indeed, it is largely the circumstance of the successful blend of these substances that "makes" the jelly powder.

The product is nothing if not constant in composition—that is, qualitatively. It would seem, therefore, a simple matter to produce the article by simple blending of the necessary components. Such, as a matter of fact, is the case, only providing the said simple blending is accompanied by an intelligent application of the knowledge of the requirements of each component in relation to the demands of the others with which it is combined. It is essential, also, to know just what the to-be-aimed-at ideal is, and to approach it as directly as possible, deviating only where necessary to avoid intervening obstacles.

What, then, is the ideal? So many factors constitute it that approach can best be made by summarising them. The ideal at once resolves itself into two parts: the two forms in which the product meets the consumer. These two parts are the primary, or packaged, state, and the secondary, or ready-for-the-table, state.

Primarily, since the product is declared to be "jelly powder" or "jelly crystals", it follows that it should greet the purchaser in a discontinuous form. A coherent mass is deceptive and disappointing. As to colour, sufficiency in depth of shade, which means something halfway between chromatic anæmia and garishness, and evenness of distribution should be the rule. Pertinent or representative colour, too, while more important to the secondary state of the product, is an advantage in the primary state, for it at once conveys to the eye an impression of "genuineness" an irrelevant shade does not. Lastly, if, as it invariably does, the product bears an odour, it should at least be suggestive of the fruit it is meant to represent rather than of something out of a test-tube.

Before the powder can achieve the secondary state it is subject to certain manipulations at the hands of the housewife. The picture of the ideal would hardly be complete if the qualities of most importance in this intermediate stage were overlooked. Fortunately they are few, being simply the matters of complete and rapid solubility, and reliability of the subsequent gel.

In the secondary state the aim is even higher. Since much of the appeal of the jelly as a dessert lies in the manner it can be decoratively moulded, the gel should be adequate enough in strength to maintain its contours when support is removed. Discretion, though, is vital, for too strong a gel will be tough and short in texture. Visually, colour and clarity are most important, the latter especially so when the frequent reaction to a clouded jelly is a sense of doubt as to its wholesomeness. Taste, the final and perhaps most exacting condition, is the hardest to meet. The jelly should meet the palate undeniably in fidelity of flavour, sweet enough to fall just short of any cloying effect and acid enough to titillate the tongue and, by contrast, bring out the full flavour.

Fulfilment of the ideal so roughly sketched is the object of the manufacture of the jelly powder, and manufacture is as much a question of selection as it is of technique. To deal as briefly as possible with the problems incidental to selection as a prelude to those of technique is to resort again to summary.

Sugar

Sugar quality is neither difficult nor costly to arrive at or maintain. Usually, cane or beet sugar is used, with sometimes the admixture of a variable quantity of cerelose or granulated corn sugar. The granulation of the sugar warrants a little consideration. If the product is offered as jelly powder a finer granulation will be desirable than if it is marketed as jelly crystals. However, the finer the granulation the more susceptible is the product likely to be to the influence of atmospheric humidity.

Gelatine

The numbers of diverse qualities of gelatine obtainable and the sometimes casual index of its worth its cost represents makes selection difficult. It must conform to many requirements, too. Mere strength is often and mistakenly the sole quality sought. Strength is important, of course, but since it is a factor whose fluctuations can be compensated for by fractional adjustments to the formula, attention is better paid to some of the more rigid qualities. Solubility has been mentioned above for the reason that a gelatine which is tardy in dissolving is apt to exist in the finished jelly only in partial solution. When this happens there is little hope of a satisfactory gel ensuing, with the obvious and dire reaction of the housewife to the product. Clarity also has been mentioned and is brought in here to further remark that it is not always met with, even in the best gelatines. The qualities of odour, taste and colour of the gelatine should not escape scrutiny. The finesse, both of colour and flavour of the ultimate product, is far too easily spoiled if the gelatine contributes a taste of meat, glue or char, or exhibits a brown colour that interferes with the shade which should be imparted only by the intended colour.

There seems to exist a certain difference of opinion as to the relative properties of bone or ossine gelatine as

compared to those of skin or hide gelatines. In the writer's experience, he has found that it matters not which kind is used so long as one or the other will meet the standards required. The best of both appear to have reached that enviable state where their further improvement seems unlikely.

The bacteria content of the gelatine must not be overlooked. Unless he is properly equipped for the purpose of making his own tests, the manufacturer has usually to rely on his faith in the gelatine to carry him. In many countries, now, food regulations insist upon a certain minimum, particularly of the *coli* type, of bacterial content, and although such regulations usually strike at the source of supply, it is not safe to gamble blindly and some means of control should be instituted.

Over and above all these conditions stands in importance the ability to maintain the standard of quality adopted at the outset. Here, the varying standards met with in speculative buying demand capable control which, if not available, should limit all purchases to one or two sources of proven integrity.

Acid

While phosphoric and malic acids have been met with in jelly powders, their use is now almost universally superseded by that of citric or tartaric acids. None but that of pharmacopœia standard should be used, for although the acid content of the powder seldom exceeds about 2 per cent., neglect of the quality of even this small proportion is indefensible. Citric acid is generally conceded to be less crude upon the palate than tartaric acid, which consideration, however, may be offset by its greater cost.

Colour

The colour question is not as simply disposed of in this country as it is in certain others where a permitted list limits the judgment of the manufacturer. Without doubt, the purchase of colour from the original producers, who will seldom baulk at certifying as to the purity of their products, is the safest course to pursue. The "middleman" who obligingly offers to match and supply any desired shade does no more than a competent chemist can. His (the middleman's) most usual practice is to buy his colours, blend them and then "stretch" them, in the dry, by the addition of powdered sugar, sugar of milk, starch or other diluent, until instead of a colour usually about 90 per cent. pure, varying strengths from 50 per cent. downwards are offered. Buying from the original manufacturer one does at least know what colour is being used, its freedom from diluent and relative purity. As with gelatine, there are aspects of the choice of colours which repay consideration. Brilliance of shade is offered by most, but not by all, and no premium is charged for it by those that do. The colour must, of course, be soluble, and this is a point which concerns the manufacturer in that it affects his process as well as, later on, the success of the product. In order to colour the batch mixture of gelatine and sugar, the quantity of colour has to be dissolved completely in a minimum amount of water. Failure of solution is liable to result in the addition to the batch of small lumps of undissolved colour which will favour the particular package graced by its presence with an overdose of colour as soon as the housewife begins operations on it. The general stability of the colour to the kind of chemical it may possibly meet —water, say, that has been treated with ozone or chlorine, or the frequently encountered traces of sulphur dioxide accompanying the gelatine—should be established before any colour is finally adopted for use.

Flavour

Selection of flavour is a problem unto itself. The three most common classes of substances that enter into it are (*a*) natural oils, of which the most familiar examples are the citrus oils; (*b*) natural fruit juices, usually highly concentrated; and (*c*) synthetics, whose quality is as variable as their number is great. Yet, before account can be taken of the employment of the multitude of these substances, it is necessary to decide first upon the kinds of flavour.

Fortunately the popular demand for jelly powders is confined to a few, possibly ten or fifteen, well-defined flavours upon which attention can be more easily focused. Although territorial preferences are somewhat diverse, they can, in this instance, be narrowed down to an embrace of certain *types*. Included among these are the citrus flavours such as lemon, orange and less popular lime; the "soft" fruit flavours, all closely related, such as raspberry, strawberry, grape, black currant, pineapple, wild and black cherry, banana, etc., and the newer passion fruit and fruit-medley types; and a few miscellanies such as pistachio, vanilla, calves'-foot, etc., but which do not include those, like chocolate and coffee, which may be considered to fall into the speciality class. Faced with this array, the manufacturer has to make his choice of those which must constitute his range of flavour varieties. The problem is his alone, a personal one.

To attempt to deal, with any justice to the subject, with anything more than generalities of the practice of what remains the undeniable art of flavouring would be far beyond the scope of this article. What is more important is that the complexity of any one flavour should be fully appreciated. Each is an individual composed of other individuals—each with its special properties and requirements which demand critical balancing. The matter is one best left to a capable technician, one who realises that the fabrication of a flavour and its transfer from the bench to the batch commands that something distinct from mere chemical knowledge.

Incorporating Colour and Flavour

So much, then, for the component parts of the product. However, the ground is a little firmer where technique is concerned. There appear to be two fairly distinct methods of incorporating the ingredients. In the one case, which is apt to be somewhat wasteful of flavour, exposed mixing is resorted to. In the other method, that of enclosed mixing, a certain economy in flavour is effected but other drawbacks are involved. Exposed mixing is first considered.

The type of mixer required is one that will expose

the maximum surface of the batch to the drying action of the air. This must be done in such a manner that a minimum of frictional heat is engendered. The usual procedure is to make a mixture of the flavour and colour solution and add it to the sugar in the mixer. The amount of moisture so incorporated is enough to run the colour to a bright shade and at the same time adequately to damp the sugar so that, without being actually wet, there is a surplus sufficient to transfer some of the colour to the gelatine, which is next added. To ensure that this shall happen, an over-surplus of water is added, then allowed partially to dry out of the sugar. The critical moment for introducing the gelatine is when the sugar is neither too wet nor too dry: the one condition will first swell the gelatine, making it difficult to dry and impart an eventual appearance of "salt and pepper" to the batch; the second condition finds the gelatine still uncoloured at the end of the mixing period, with a "sand and sugar" effect. Thus the gelatine is introduced, mixing proceeded with until the batch is dry, and lastly the acid is added. In order to inhibit the well-known, and in this case, deleterious action of acid on sugar, it is advisable to have the acid in as coarse a granulation as appearance will permit and to make its addition to the batch only when the latter is so indisputably dry as to be dusty.

Enclosed mixing involves the use of the more conventional opposed concentric worm type of mixer. The general procedure followed is much the same as that outlined for the exposed method with the exception that, as contact with the air is practically precluded, little, if any, moisture may enter the batch. To enable a dilution of the colour to the point where it becomes bright throughout the batch, it is previously worked into a portion of the sugar, dried and sometimes powdered, in which form it re-enters the batch for the mixing. The use of fruit juices in the flavour is not permissible in this case; they contain, no matter how concentrated, a certain amount of inevitable moisture. Non-aqueous flavour mixtures only can be considered. The same factors that preclude the use of juices, however, enable any other form of flavour to perform much more efficiently in that little loss in strength occurs from exposure to the air. Which ever method is adopted, until some better means of flavour transference is discovered or some super flavour fixative, either is little more than a compromise to a number of opposed factors.

The above account does not lay claim to embrace all the slightly differing methods in use. Nevertheless, it is representative of those generally practised. It does not mention, for instance, a distinct type of powder by which the flavour is introduced in a separate and liquid condition enclosed in a container of sugar crystals; nor another kind of powder which attempts, successfully but clumsily, to overcome the difficulties inherent to the transfer of the flavour by including a sort of miniature jelly tablet containing the concentrated flavour. Again, mention of dry flavours, in which much advance has been noticed in the past few years, has been omitted. All of them are "special" processes, and most of them are well protected by patents. That they represent outstanding examples of possible improvements in jelly powder goes without saying. They do not, however, approach the ultimately satisfactory article, and their mere existence should act as a stimulus to the search that must continue for a better product.

British Industrial Interests in China

A MEETING, convened by the Federation of British Industries in conjunction with the China Association, was held at the F.B.I. offices on September 29. It was well attended and included representatives of most British companies, both manufacturers and merchants, owning property or having important interests in China.

Actual and Consequential Damage

The meeting was notified of information contained in a cable from the F.B.I.'s representative in Shanghai. This information was to the effect that material losses, owing to fire, shelling, and looting, were large, but that it was impossible to give even an approximate estimate at the present moment as assessors were unable to visit all the districts concerned, and could not enter merchants' wharves which are occupied by the Japanese. The cable went on to say that the potential losses due to trade restrictions would be even more serious to British interests.

The meeting then considered the consequential damages which were already arising out of the action of the military forces engaged; these consequential damages include substantial loss of trade owing to commercial chaos, and general insecurity. The meeting then passed, for submission to His Majesty's Government, the following resolution:

"That this joint meeting of the representatives of the Federation of British Industries, the China Association, and the Bradford, London, and Manchester Chambers of Commerce urges upon H.M. Government the vital necessity, in the interests of future British trade with China, of taking all possible steps to prevent further damage to, and further encroachment on, British interests in Shanghai and elsewhere in China, of putting an end at the earliest possible moment to the encroachments which have already taken place, and of securing the restoration and maintenance of normal trading facilities and security, with a view to avoiding further serious consequential losses to British interests."

Claims and Damages

It was the opinion of the meeting that all claims, both for physical and consequential damages, should be registered on the spot by H.M. Consular Officers. It was also unanimously decided to press upon H.M. Government that energetic action should be taken to obtain the fullest compensation for all damage and losses suffered by British interests.

A Committee was elected to watch further developments.

FIFTY-NINTH CANADIAN NATIONAL EXHIBITION

THE fifty-ninth annual Canadian National Exhibition opened on Friday, August 27 last, at Toronto, with many new features of particular interest to those engaged in the food industry.

The Rt. Hon. Malcolm MacDonald, Secretary of State for Foreign Affairs spoke by transatlantic telephone from Lossiemouth to open the Empire exhibit in the Government Building. A view of the British Section is shown in the accompanying photograph. Messages too, from Rt. Hon. J. A. Lyons, Prime Minister of Australia and Rt. Hon. W. L. M. King, Prime Minister of Canada, were received, while amongst those present in person at the opening ceremonies were H.M. High Commissioner in Canada, Sir Francis Floud, K.C.B.; L. R. MacGregor, and D. de W. Meyer, Trade Commissioners for Australia and the Union of South Africa respectively; J. W. Collins, Ireland Trade Commissioner, and B. D. Asli, India Trade Publicity Officer for Canada.

An innovation was the dedication of one day, Wednesday, September 1, as Food Products Day, which was one of the most popular and generally patronised days of the whole period. Crowds centred around the magnificent Food Products Building, and the main feature of the day was a gigantic "treasure hunt" sponsored by some sixty food concerns, manufacturers and manufacturers' agents, representing every phase of the food industry.

The Pure Food Building, Canadian National Exhibition.

Speaking at the C.N.E. Directors' Luncheon on this day when food manufacturers were the guests of honour, Col. R. L. Wheeler, Dominion Fruit Commissioner, stressed the effort demanded of the food manufacturer to keep abreast of the changing demands in foodstuffs of the consumer. He cited as an example of this change the fact that green asparagus is now in demand to the almost total exclusion of the white variety, popular not long ago. He further outlined the development of the McIntosh apple and the culture of the new "V" type peaches which are fast ousting the older "cling-stone" type of this fruit. "Contempt for canned and cold-storage products is a thing of the past", he reminded his hearers.

The new "V" type peaches referred to by Col. Wheeler were the subject of a special display elsewhere in the Exhibition grounds. Enquiry elicited the information that they were developed by the Ontario Government Experimental Station and were now being grown extensively in the finest peach-growing district in Canada—the Niagara Peninsula. This year the peach crop of the whole of Canada is estimated to amount to 628,000 bushels, an increase of 25 per cent. over last year's yield, and one of the largest crops on record.

Food Industry's Support for Decimal Reform

THE food industry is showing keen interest in the present campaign to secure the adoption of a decimal coinage and metric system of weights and measures in Great Britain. The Decimal Association reports active support from a number of firms engaged in the trade and its subsidiary interests.

It is pointed out by the Association that the existence of this support is clear proof of the benefits which would be secured by the food industry in particular by a reform to decimal calculations. The firms giving financial support to the Association's campaign—begun in January this year—are doing so because they believe that success would bring them undoubted future economies.

Amongst the firms supporting the Decimal Association are: Bovril, Ltd., London; Virol, Ltd., London; Danish Bacon Co., Ltd., London; Horlicks, Ltd., Slough; C. Y. T. Harris (Calne), Ltd.; Lovell and Christmas, Ltd., London; Dried Milk Products, Ltd., London; Chicory, Ltd., St. Ives; South Wales Canister Co., Swansea; Wilson Meats, Ltd., London; W. D. Brabin and Co., London; Ridpath Brothers, Ltd., London; H. Salvarelli Agencies, Ltd., London; Waffle Products Co., Ltd., London; G. J. Biro, London; Produce Merchants, Ltd., London; Beddington Nut and Produce Co., Ltd., London; Bel Cheese, Ltd., Southampton; Briggs, Abbott and Co., London; James Cook and Co., London; S. and W. Fine Food Products, Ltd., London; Standardised Food Products Co., Ltd., London; Vegidine, Ltd., Welwyn Garden City; W. G. White, Ltd., London; Carl Wolff (Agencies), Ltd., London; Golden Ruskit, Ltd., London; J. W. Galloway, Ltd., Glasgow; Gill and Duffus, Ltd., London; J. Goodman and Co., Ltd., London; J. T. Hart and Sons, Ltd., London; Lloyd and Carter, Ltd., London.

BOOKS *and* LETTERS

Plantation Crops

THE popularity of chocolate is growing rapidly both in the United Kingdom and in the United States. This is one of the deductions which can be drawn from the facts summarised in the latest issue of the Imperial Economic Committee's review *Plantation Crops* just issued. Throughout the depression imports of cocoa in both countries continued on a high level, but with its passing jumped rapidly—in the United Kingdom from 76,000 tons in 1934 to 113,000 tons in 1936; in the United States from 197,000 to 282,000 tons. The year 1936 was a record one for cocoa. The Gold Coast, the chief exporting country, shipped 311,000 tons, over 40,000 more than in 1935.

World exports of sugar and tobacco, after a marked decline during the depression, improved after 1934; but in 1936 were still substantially below the level of 1930. Exports of tea, coffee, and rubber have been subject, in varying degree, to regulation. This has tended to stabilise the total quantities shipped abroad by the producing countries. Thus, the world exports of all three commodities in 1936 showed little change as compared with the previous year. In both years, however, the total quantities of rubber and coffee exported were somewhat greater than in 1930. Tea exports, on the other hand, were less than in 1930.

A useful feature of *Plantation Crops* is the summary given of the international agreements regulating exports of sugar, tea, and rubber. The review brings together in convenient form the significant data relating to sugar, tea, coffee, cocoa, spices, tobacco, and rubber. Tables of statistics included cover area under cultivation, production, exports and imports, stocks and prices.

Plantation Crops. Price 2s. 6d. (2s. 9d., post free).

The Relation of Nutrition to Health, Agriculture and Economic Policy

The result of two years' work by an international committee of agricultural, economic and health experts, this Report is concerned mainly with the economic aspects of nutrition policy and with its relations to agriculture.

The Report is divided into three parts. The first part presents a general survey of the problem and of the work already carried out. The third chapter summarises the contents and conclusions of the Report and reproduces the recommendations published by the Committee in its Interim Report. The science of nutrition has participated in the advance of medical science in its fight against disease, but the application of this new knowledge has only just begun. Habit, ignorance and poverty are the stumbling blocks. In western communities marked changes of food habits in the right direction are noticeable. This tendency has been the result of the unconscious and instinctive groping for a more abundant life.

What is urgently required is the conscious direction of natural tendencies and the adoption of a policy which will concern itself not only with bringing certain foods (which modern physiology has shown to be essential for health and physical development) within the reach of all sections of the community, but it must also concern itself with supply; this is a direct challenge to statesmanship. If nutrition policy is to be effective, the problem must be recognised as one of primary national importance. Whilst the Committee stresses the importance of the work of the National Nutrition Committees, it considers that the ultimate responsibility for the nutrition and health policy of a nation must rest with that nation's Government.

The second part of the Report devotes itself exclusively to the health aspect of nutrition. The principles of correct nutrition, so far as they are understood at the present time, are laid down. It contains a description of the most important vitamins and their relation to "deficiency diseases"; an analysis of the nutritive qualities of various foods, and their classification as "energy-bearing" or "protective"; the dietary requirements of particular classes of persons, expectant mothers, infants, children of pre-school and school age, adolescents, recruits and adults; and a summary of the dietary standards adopted by the Technical Commission of the Health Organisation of the League of Nations and of the valuation placed by this Commission on various important foodstuffs.

The third part of the Report contains a more detailed examination of the economic and agricultural considerations connected with nutrition policy. The main changes which have occurred in food consumption habits during the last few decades are described. The second chapter discusses the problem of the adaptation of agriculture to the desired changes in consumption. It is argued that an extension of the movement towards better nutrition should prove of benefit to national agricultural systems, calling for an increased production of protective foods—fruit, vegetables and dairy products—and for an increased output of various cereals for fodder.

Chapter 3 deals with the relation of food prices to consumption and shows that the demand for foodstuffs, more especially for the protective foods, is sensitive to price changes.

The chapter following refers to the contribution of the co-operative movement in reducing retail food prices. It also discusses the supply side and the influence of technique, costs of production, commercial policy, marketing organisation and distribution costs upon food prices. In the last chapters, family budgets in different countries are given. These demonstrate the improvements of diet which are the result of increased incomes.

The Report stresses the necessity for further exhaustive analysis of nutritional requirements to the end that a balance be made between producers' price needs, consumers' purchasing power and the economic structure of the State.

Malnutrition is one of the world problems of to-day, and it is not confined to the poor. Ignorance will produce undernourishment as differentiated from actual lack of necessary food. "The maltnutrition which exists in all countries is at once a challenge and an opportunity; a challenge to men's consciences and an opportunity to eradicate a social evil by methods which will increase economic prosperity."

The simple style and comprehensive treatment of the subject makes this book equally useful to the layman and the expert.

Final Report of the League of Nations Mixed Committee on the Relation of Nutrition to Health, Agriculture and Economic Policy.

Food Technology

This book is an attempt to include in one volume the history, statistics of production, technology and biology of the principal food products.

There are twenty-two chapters, which include twenty-one main items. "Meat and Meat Products" occupies forty pages, "Sugar and Syrups" thirty-five, and so on. The authors have managed to cram an enormous amount of information in the space at their disposal, and they have

obviously intended it for the student rather than the specialist. They state that " as teachers who have for many years been specially concerned with the training of students who were to find places in the great food industries, we were unable to find any single volume that could serve as a basis for a broad and constructive treatment of this important field of food technology ".

The careful study of this book, which is written in a very clear and bright manner and is remarkably free from inaccuracies, will certainly repay anyone desiring to obtain a broad and general idea of the food industry.

T. C. W.

Food Technology. By Samuel C. Prescott and Bernard E. Proctor, Massachusetts Institute of Technology. 6½" × 9¼"; *cloth; illustrated. Price* 30*s.*

Annual Review of Biochemistry

Although the Annual Review is in but its sixth year, it has already won such a commanding position in the literature of the subject that the advent of a new volume is always awaited with considerable interest. The present volume fully maintains the high standard of the previous volumes of the series.

It has become an established practice for the editorial committee to allot the duty of reviewing individual sections of the science to those authorities who, by virtue either of their original work or of their comprehensive knowledge, are considered best fitted to deal with the subject. To preserve a balance of view-point, however, the reviewers responsible for individual sections are periodically changed; thus we find vitamins, which in the early volumes were reviewed by L. J. Harris, and then by H. von Euler and E. V. McCollum, are now discussed by C. C. and H. C. Sherman; similarly in the case of the alkaloids, the pen of R. Robinson has given way to that of E. Spath.

The sections, twenty-eight in number and each limited to 20-30 pages, deal with subjects such as permeability, enzymes, the chemistry and metabolism of carbohydrates, lipins, steroids, proteins and the various degradation products of these, hormones, vitamins, plant pigments, bacterial chemistry, etc. In one of the early volumes, the committee expressed the hope that they would be able to reduce the size of succeeding volumes, but the science is extending its boundaries at such a rate—some 10,000 abstracts of papers in biological chemistry appeared in chemical abstracts in 1936—that the reviewers and the committee must be congratulated on the selection of material and the manner of its presentation. Naturally, it cannot be regarded as easy reading except for those fully conversant with the subject.

Year by year, the committee make innovations which are invariably good, no doubt because they are the result of experience gained. The two chief ones in the present volume are the subject index and a section dealing with the application of micro-chemistry to biochemical analysis. The first fills a wide gap. An index to a volume of this kind is perhaps not missed by the reader who is leisurely acquainting himself with the progress of a subject, but the omission becomes serious when the busy worker wishes to refer quickly to a particular aspect of the subject. In mentioning this point, the reviewer may be pardoned for expressing the wish that a combined index covering the previous volumes be undertaken in the near future. The second of the innovations, in view of the part played by micro-chemistry in the development of the subject, is also welcome. Its future treatment, if the section is to make periodic appearances, will require careful handling.

At the price the book is excellent value; no biochemist, whatever branch he deals with, can afford to be without it.

W. R.

Annual Review of Biochemistry. Vol. VI. Edited by J. M. Luck. California. Price $5.

Sugar in the Air

At long last we have the novel, dealing with a technical subject, which can be read by chemists and technicians without that feeling of irritation occasioned by the subject being (1) fantastic and (2) inaccurate in its scientific pretensions. The lay reader has the comfort of a first-class yarn plus the knowledge that his author is not drawing the bow too long. Technical accuracy is assured by the fact that Mr. Large is a member of the B.A.C. and holds a degree in chemical engineering.

The tale is concerned with the logical development of Professor Baly's production of sugar by the action of light on water charged with carbon dioxide—a startling and fascinating theme. The hero is a chemical engineer and, as the story unfolds, it is evident that the vicissitudes he suffers and the mental outlook developed are reflections of the author's own experiences.

Adopted by a three-million-pound company, the process suffers neglect by nearly all connected with it—the main concern of the works staff being petty jealousy, and that of the directors a criminal ignorance both of the latent possibilities of the process and of business generally.

Of the entire staff, the central figure of the young scientist alone possesses the inner and deeply passionate desire to complete and utilise the synthesis for the benefit of science and mankind. The chemists, works assistants, company promoters, directors and financiers are live, everyday people whom everyone has met. It is unnecessary here to detail the story's ending. It is written with a pathos that only a true scientist and an able writer can command.

There is romance aplenty, and satire, a purple patch, and, above all, truth in the pages of this work. Every chemist should read it, and all others, not forgetting company directors, who will perhaps find guidance on matters with which they are, for the most part, painfully ignorant. Well done, Mr. Large, we look to your next book. J. P. L.

Sugar in the Air. By E. C. Large. Pp. 447. *London.* 1937. 7*s.* 6*d.*

To the Editor, *Food Manufacture.*

Sir,

I have the honour to refer to an article on " The Manufacture of Chewing Gum " which appears in the August, 1937, issue of Food Manufacture. The Sapodilla tree (*Achras Zapote* L.) is native in the Yucatan peninsula and adjacent regions and is a common tree in the colony of British Honduras. The bleeding of the trees for chicle is one of the major industries in the colony, which has produced for export an average of 552,000 lb. of chicle annually during the last twenty-one years, for which export figures are available.

The quantities and values of chicle for domestic origin exported in the last four years are given below:

	Lbs.	*$*
1933	726,783	210,031
1934	787,526	199,572
1935	735,240	174,874
1936	767,153	191,069

In 1936 the destination of the chicle exports was: approximately 70 per cent. to the U.S.A., 16 per cent. to Canada, 13 per cent. to the United Kingdom, and 1 per cent. to Germany.

It does not yet appear to be appreciated in the United Kingdom that the colony is the only producer of chicle in the Empire, and that chicle can be obtained direct from Belize. The forests of the colony are also capable of producing large amounts of crown gum, which can be used as a chicle substitute and is obtained from species closely related botanically to Sapodilla.

Enquiries addressed to the Conservator of Forests, Belize, British Honduras, will be passed to local dealers in chicle.

I am, sir,

Your obedient servant,

Neil S. Stevenson,

Conservator of Forests, British Honduras.

INDUSTRIAL NOTES

Apple Survey

Mr. Spencer Mount, of Canterbury, who claims to be the largest apple grower in the British Isles, is at present in Canada, a guest of the Canadian Horticultural Council. The object of Mr. Mount's visit is a survey of the production, grading, packing, and marketing of apples in the Dominion. He will report his findings to the Empire Fruit Council.

Starting in the Nova Scotian district of the Annapolis valley, the home of some of Canada's finest apples, Mr. Mount's tour will embrace visits to orchards and packing houses in every Province; he will make first-hand acquaintance with the Dominion Experimental Farms and officials of the Fruit Branch and Marketing Services of the Dominion Department of Agriculture.

The imminent apple crop from Canada is expected to be a sumptuous one of something like 15 million bushels, or approximately the equivalent of the present average production of the fruit in this country.

* * *

Milk Cookery

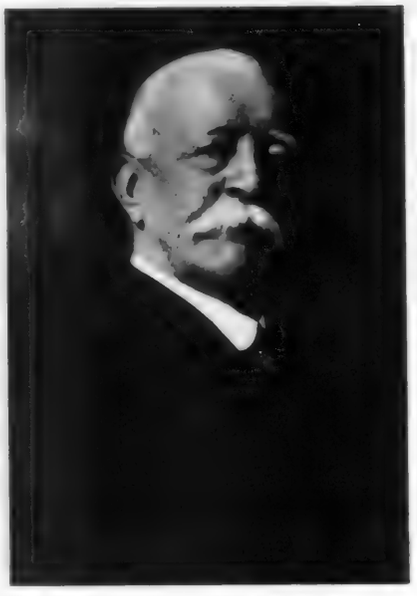
A novel exhibit was staged by the Scottish Milk Marketing Board at the Housing and Health Exhibition in the Kelvin Hall, Glasgow, from September 29 to October 23. A portion of the stand was devoted to demonstrations on the preparation of attractive dishes, the main ingredient of which was milk. Using a hot-plate, the Board's lady demonstrators at stated hours made appetising soups, tasty savouries, and attractive sweets, the recipes for all of which were available free of charge at the stand.

While the ladies were learning of new milk dishes, the menfolk ordered refreshers for them at the milk-bar, which occupied the remaining portion of the stand. The bar had "on tap" over forty different milk drinks.

* * *

A New Line

Sea-Urchins have been a favourite hors d'œuvre of the French people for years, but a method of packing them was perfected only recently by Dr. A. LeBollock of Saint-Pierre, U.S.A. Housed in 1-oz. and 2-oz. Capstan tumblers, sealed with an Anchor D cap, the Sea-Urchins are marketed by L. A, Champon of New York City under their French name of "Supreme D'Oursins".



The late Mr. E. C. Barlow.

Obituary—Mr. E. C. Barlow

It is with deep regret that we record the passing of Mr. Edward Charles Barlow, who was, right up to the time of his death at the age of 90, one of the best-known figures in the tin box industry.

In his teens he started making tin boxes in a spare room of his home; in 1869, Edward C. Barlow and Sons, Ltd., was started at Hackney; and in 1929 this firm was merged into the Metal Box Co., Ltd., of which concern Mr. Barlow's second son, Mr. Robert Barlow, is now managing director.

Mr. Edward Barlow was a model employer, and the hundreds of his workpeople who attended his funeral bore testimony to the esteem in which he was held by them. Mingling with the crowd at the funeral, one overheard many spontaneous tributes to this grand old man, both from people who had worked for him and from people who had done business with him. Few people can have been so universally liked and admired.

Until the time of his death he took an active part in the affairs of the Hackney Works, where he is succeeded by his elder son, Mr. Ernest Barlow.

* * *

Canned Potato Salad

Potato salad now appears, somewhat tardily but nevertheless inevitably, in cans, and is probably the most recent addition to the ever-growing list of foodstuffs so to be packed. The well-known firm of Aylmer is now offering it to the Canadian public, from whom a steady demand for the product is freely predicted.

The product consists of cold cooked potatoes well diced or sliced, mixed with mayonnaise or salad dressing. To this, the base of the preparation, are further added such tit-bits as cooked green peas, onion, and pimento to enhance, both to the palate and the eye, the effect of the whole. The canned product, in a container of dimensions to provide an ample serving for four persons, retails at 17 cents (8½d.), this being at present the only size obtainable.

* * *

Rochdale Bakers Fined

Burneys, Ltd., bakers, of Dodgson Street, Rochdale, were fined £5 with 5s. witness fees last month following an accident in their factory. The summons was issued under Section 79 of the Factory and Workshop Act, 1901, and it was alleged that an electrical connection failed to comply with the standards of safety laid down.

It was reported that an assistant received a shock while changing the connection of a chocolate-melting pan, which worked off a two-way adaptor. She was rendered unconscious.

A factory inspector said that had the connecting pins of the adaptor been shrouded, as laid down in the regulations, the accident could not have occurred. The appliance had been in use since 1933, and was as supplied by the makers.

* * *

75th Anniversary

Congratulations to H. Mayer Senior, Ltd., vanilla and general colonial produce importers and merchants, on the celebration of the seventy-fifth anniversary of their establishment. The firm has received many expressions of goodwill from friends in the trade.

* * *

Hotel Restaurants and Catering Exhibition

This exhibition will be held at Olympia, London, from November 30 to December 8. The whole of the industry is covered and a number of culinary competitions will be held. The entries for a few of the sections of interest to food manufacturers are as follows:

Food (canned goods, cooked meat, sauces, tea and coffee, etc.), 10.

New line from Cadbury's—diabetic chocolate, in the manufacture of which no sugar is used.

Refrigerators and air-conditioners, 6.

Wines, spirits, beer, and minerals, 2.

Kitchen equipment (cookers, water heaters, cooking utensils, dish washers, etc.), 25.

* * *

Palestine Growing Sesame

After many trials, sesame seed has been successfully planted in Palestine, and good crops are anticipated. Sesame oil is used in the manufacture of Halva, a popular Eastern sweetmeat which has been introduced into this country, but not with great success. It is sold in Palestine in great quantities, both plain and chocolate covered, hence great interest attaches to the success of the local growers, who have a potential "doorstep" market of 500 tons per annum.

The market price of sesame seed is about £18 per ton, and it is hoped to produce it in Palestine for not more than £9 or £10 per ton.

* * *

1938 Calendars

Polak and Schwarz (England), Ltd., advise us that refill pads for their calendars are now ready. These calendars were originally sent out two years ago and anyone who requires a refill pad for 1938 should communicate with this company at 155, New North Road, London, N. 1.

* * *

Changes of Address

The offices of J. and E. Hall, Ltd., have been transferred to 10, St. Swithin's Lane, London, E.C. 4.

* * *

Milk Cubes, Ltd., have moved their offices to more spacious accommodation at Thames House, Millbank, London, S.W. 1. Telephone Victoria 5134.

Manucol Products, Ltd.

Manucol Products, Ltd., inform us that from October 1 the manufacture and sale of their brand of purified Sodium Alginate, known as "Soluble Manucol", were taken over by Albright and Wilson, Shell-Mex House, Strand, London, W.C. 2. The registered offices of Manucol Products, Ltd., have also been changed to this address.

* * *

The pure nickel autoclave shown above has just been installed in a German food factory. The working pressure is about 220 lbs. per square inch.

Purdy Labellers

With regard to the article which appeared in our October issue, "Meat Canning in the Irish Free State", we should have mentioned that Purdy "New Way" can labelling machines are used in the factory of Clover Meats, Ltd.

Two new food packs recently shown at the International Exhibition of Modern Packaging in London. Below, pack by Örebro Geka Biscuits, Sweden. Right, flour bag by J. W. French and Co.; after use it becomes a handkerchief.

B.I.F. by Camera

One hundred thousand copies of a brilliantly illustrated brochure, showing at a glance the immense variety and range of products assembled in London and Birmingham for the British Industries Fair, will shortly be distributed to importers in more than 100 Empire and foreign markets. This admirable guide is printed in nine languages and gives all the relevant facts relating to the 1938 Fair.

The products of 76 different trades will be arranged side by side in their various sections, at Earl's Court, Olympia, and Castle Bromwich, and the buyer will be able to see without any waste of time or effort the comparisons and vital items he seeks.

Since its inception 28 years ago, the British Industries Fair has steadily grown and, from information already to hand, it is clear that our present prosperity will be reflected in record figures for 1938.

* * *

Results in Advertising

It has been our pleasure to read a booklet called *Results*, written and published by Holman-Advertising. This booklet contains, in a very interesting way, the brief, candid story of the progress of this agency; in Laurence Holman's own words, a "record of success achieved, and failure frankly admitted". The length of time for which some of the accounts have been handled is significant. The booklet itself, as befits a booklet coming from an agent who handles other people's printed messages, is, to say the least of it, distinctively produced.

PLANT and EQUIPMENT TOPICS

Hewitt's automatic taring scale. The lever is swung round to the tare weight, and the container filled until the nett weight is shown on the outer dial.

Automatic Taring Scales

Much time can be saved, it is claimed, by the use of automatic taring scales in factories where weighing is done into containers. One firm recently told Mr. A. H. Hewitt, of Worksop, inventor of Hewitt's taring scales, that such equipment "saves the jam trade lifting over a million tons a year".

Operation of the Hewitt scale is speedy and simple. The container is placed on the platform, and the dial finger shows the weight of container on one of the two scales. A lever is swung round to this point, and the material then filled into the container until the other dial registers the nett weight required. The outer dial, which registers the nett weight of material in the container, is in red.

Floor and bench models are available in all capacities, and are certified by the Board of Trade.

The new Speke factory.

New Liverpool Factory

The new works built for Manesty Machines, Ltd., and Thompson and Capper Wholesale, Ltd., at Speke, Liverpool, were officially opened on Wednesday, September 29, by the Lord Mayor of Liverpool, Alderman William Denton. The Lord Mayor, who was accompanied by the Lady Mayoress, made a formal inspection of the premises of both firms, which, though housed under the same roof, are quite distinct in their activities.

The new building is a low single-storied structure well illuminated by north light, and divided into two distinct sections. One of these is occupied by Manesty Machines, Ltd., and in it are installed the latest types of centre lathes, capstan lathes, shaping and slotting machines, radial and vertical drills, and boring machines. Manesty tablet compressing machines and automatic water stills are manufactured. In separate shops built at the side of the main building machines are painted and steel is heat treated. The heat treatment shop in particular is very up-to-date. The latest types of gas and electrically heated furnaces and salt baths are used, and the firm do all their own oxy-acetylene welding. All the designs and drawings for Manesty machines are done in their own drawing shop.

Thompson and Capper Wholesale, Ltd., carry on the business of manufacturing chemists, and concentrate on tableting materials for the trade and for their own proprietary lines, such as "Quinphos" tablets, "Sustenoid" yeast, "Q.A." aspirins, and "Mothaks". In the tablet compressing department of Thompson and Capper Wholesale, Ltd., Manesty machines are used.

At the official opening the distinguished company of guests were entertained to lunch by Alderman Edwin Thompson, Governing Director of both companies. Alderman Thompson, in thanking the Lord Mayor for having performed the opening ceremony, said that the firm was founded by his great-grandfather, Thomas Thompson, in 1798. Some time after he joined the firm the retail interests were sold, and the machinery side was developed. So rapid had been this development that a subsidiary company, Manesty Machines, Ltd., was formed. Continued expansion of the business had now necessitated the move to the new works at Speke.

Steels in the Dairy Industry

At the National Dairy and Ice-Cream Exhibition, Samuel Fox and Co., Ltd. (associated with the United Steel Companies, Ltd.), were showing examples of the uses of their "Silver Fox" new process stainless steels for plant and apparatus used in the dairy and allied industries.

In tests on various metals used in connection with milk products and under treatment that caused corrosion of other metals "Silver Fox" steels were either unaffected or, compared with other metals, showed the greatest resistance to such corrosion and therefore the least effect on the flavour of the product.

The following advantages are claimed for "Silver Fox" steels:

Easy fabrication by any metal-working process.

The steels can be handled by the tinsmith and excellent service is obtained from vessels fabricated with lapped and soldered joints.

The steels can be hot worked or welded by gas or electric welding processes.

Freedom from corrosion by milk or products of fermentation and the attack of alkali or acid cleansing powders or solutions.

No oily or metallic taste to milk products.

WHEY—

NUISANCE OR PROFIT?

The disposal of whey, which is a by-product in the process of cheese-making, is a difficult problem. We approached a number of well-known firms with the object of preparing a symposium of the latest methods used in preparing whey for the market, and we give below without comment the replies we received.

MILK CUBES, LTD.

IN THE manufacture of cheese and casein great difficulty has always been experienced in the disposal of the whey. Manufacturers have been averse to dealing with it, and many millions of gallons have been treated as a mere waste product and effluent. In recent years this practice has involved manufacturers in further difficulties, for the authorities, realising the dangers attendant upon river pollution, have compelled them to install expensive and elaborate filtration plants for the disposal of the whey.

This has given rise to the extraordinary situation that a product which admittedly possesses a definite food value is being disposed of as a waste product at a comparatively high cost. Whey contains on the average about 5 to 7 per cent. total solids as albumen, lactose, ash, sometimes fat, and lactic acid. The latter is, in moderate quantities, very useful for assimilation and digestion, while the former are of indisputable food value.

The "Milkube" whey drying plant referred to on page 390.

Whey as Feeding Stuff

These values have been recognised by some manufacturers and farmers, and they have utilised whey successfully by feeding their pigs, cattle, poultry, and horses with it. Considerable quantities have been used in this way, but this outlet is limited as the balance between the rate of manufacture and the demand for feeding stuffs is not necessarily equal. Also, the prices for livestock vary, and consequently the amount of stock varies, as well as the quantity of whey available. The cost of transport and the lack of keeping qualities are further disadvantages. Many attempts have therefore been made to reduce the high water content of the whey in order to feed a greater amount of whey in a highly concentrated form.

The aim has always been to dispose of the bulk of the whey, either for human consumption or for livestock feeding, in a non-perishable form independent of the season. For the latter purpose, the product cannot bear the heavy cost of production, for it has to compete with many less expensive articles. To make whey a saleable article of good keeping quality the greater part of the high water content of 93-95 per cent. must be extracted, otherwise the keeping quality will be very low and the cost of transport too high. Also, the product must not be spoiled, the lactic acid content must be kept fairly constant, the milk sugar must not be caramelised, the albumen must not be denatured, and the vitamins, in particular the growth-promoting vitamin C, maintained. These are indeed difficult aims.

Methods of Drying

The process of drying on heated rollers has not proved entirely successful, as the product comes out somewhat overheated and highly hygroscopic. The costs of steam consumption and depreciation are very high. Approximately 1·5 to 1·8 lb. of steam are required to dry 1 lb. of whey. The total cost of production by this process may be 14s. to 15s. per cwt., which is, therefore, the minimum price for which the product may be sold, allowing nothing for the whey itself.

The hygroscopic quality appears, but in a much slighter degree, in the so-called spray drying process, which is more expensive still.

Another method has been that of dehydrating the whey under vacuum, by which only 1·1 to 1·2 lb. of steam are required to dry 1 lb. of whey, but in a condensing plant of this nature it is impossible to convert the whey into

solid material. It is, therefore, sold as a semi-liquid product in barrels, and the high cost of packing and handling in bulk again raises the price of the product. Furthermore, the butter-like plastic consistency of the product usually obtained by these methods is not favourable for feeding purposes.

To obtain a good keeping quality, this whey has either to undergo a further chemical process or it has to be highly acid, and to be mixed with bran or other cereals. These alterations of the original qualities of the liquid whey are a drawback of this process.

To reduce the cost of production the evaporation of whey to a certain degree has been combined with the roller drying process. By these means quite a good product can be obtained, and the cost reduced to 11s. to 14s. per cwt. in commercial production.

Other methods have been suggested to dry the whey by means of complicated and expensive machines. These involve high production costs which necessitate the realisation of a high price for the product, of which only a limited quantity could, therefore, be utilised for medicinal purposes, and for certain specialities.

A New Process

A new process which has recently been patented and perfected should be of interest to all who deal with whey. By undergoing a certain physical process, which controls the standardisation of the product and its feeding value, the whey is converted into a plastic mass, and finally into hard slabs. These slabs can be milled into granules (preferred by the poultry-keeper), or powder, possessing the highest nutritive value for livestock feeding. The product is not hygroscopic, will keep for an exceptionally long period, and may be packed into inexpensive paper bags without clodding. The entire process requires only 0·5 lb. of steam to convert 1 lb. of whey into *solid* material, as the vapour from the evaporating whey is utilised in a most economical and ingenious manner. Only one-third of the water consumption of an ordinary condensing plant and 1 to 2 h.p. are required. The complete manufacturing costs amount, therefore, to only one-third of the cost mentioned above. The temperature applied is so low that the original qualities of the whey are preserved to the fullest possible extent. The plant, which is known as the "Milkube" Whey Drier, is claimed by the makers as being the cheapest yet evolved for the purpose, and the depreciation is correspondingly low. The working is extremely simple as there are no moving parts, and the handling may be done without difficulty by an unskilled man.

Value of Dried Whey

The research work undertaken by the National Institute for Research in Dairying, and the National Poultry Institute in this country (and by similar organisations on the Continent), have proved the high value of dried whey in general; but because of its previous high price and high content of free lactic acid, it could only be fed sparingly; for instance, when blended with another feedstuff in a proportion of 5-15 per cent. The whey manufactured by the new method described above can, however, be fed in much greater ratio, and even to 100 per cent., without harm to the livestock. The product is of an excellent composition, containing protein and starch equivalent in an ideal proportion, a suitable proportion of calcium lactate, and sufficient lactic acid. This, in connection with the vitamin G, influences the inner secretion, hatchability, assimilation, and reproductiveness to a great extent, in particular as the original value has been preserved by moderate temperatures. It is important to note that the product is free from copper or copper compositions, which are usually present when copper plants are employed. Apart from feeding purposes, the product offers scope for human consumption, and in various industries.

This process should prove of great interest to all producers and users of whey. In the interests of economy it is essential that whey, in which there is so much food energy value, should not be wasted.

GEORGE SCOTT AND SON (LONDON), LTD.

One of the main difficulties in the handling of whey is to deal satisfactorily with this at any stage of its production no matter whether it be sweet whey or highly acid. Readers are probably aware of the fact that to attempt to dry an acid whey in a spray drying machine or on rolls, etc., is likely to cause considerable difficulty, and is in many cases quite impossible. We have, however, found no difficulty whatever in dealing with quite acid concentrations, which are in certain cases unavoidable, due to adverse weather conditions or delay in handling the material. There is, of course, no doubt that the finest whey powder is produced from a fresh whey, which should be processed as soon as it could possibly be obtained from the cheese vats. It has been found that whey during storage in the whey tanks increases in acidity at a very high rate.

Whey of any description may be concentrated to about 60 per cent. solids, when it is usually run into barrels or used for the manufacture of lactose. The material finds a market as one of the ingredients of compounded cattle foods.

The Drying Operation

When proceeding to dry the material on the vacuum band dryer a further concentration is taken up to about 70 per cent. solids, and for this purpose it is essential to use the "Scott" patent forced circulation evaporator so as to maintain this heavy liquid in constant movement.

The material is usually prepared in a batch, the batch time probably extending to six or eight hours. On reaching the desired concentration the material is charged into a waiting tank fitted with a stirrer and jacketting arrangements, where it is maintained under vacuum, and which serves as a feed vessel for the vacuum band dryer.

The dryer is most satisfactorily worked over a period of twenty-four hours, and it is usual to send up three batches of concentrated whey per day. The whey is pumped on to a number of slowly moving bands passing

A belt-driven centrifugal by Watson, Laidlaw and Co., Ltd. (Weston type, swan neck pattern).

over heated hotplates mounted in a vacuum chamber. Very complete arrangements are made for the separate control of the various hotplates, etc., so that any desired drying conditions may be obtained. The product is discharged from the bands in the form of a crust which falls into the upper of a pair of hoppers, where it is dealt with in a patented arrangement for grinding to the required grist entirely under vacuum. The finished powder is discharged to the lower hopper, from which it may be periodically withdrawn. It has been found that this material keeps practically indefinitely without alteration. In the majority of cases it is found also that the whey powder is non-hygroscopic.

The grist may be altered according to requirements, the material finding a market for patented foods, biscuit manufacture, cattle food, etc.

Steam Consumption

Steam economy has been very carefully considered throughout the process. By using a double-effect evaporating plant for the greater part of the operation, the steam consumption is very considerably reduced and the steam consumption of the dryer is extremely low. Double-effect evaporation is carried out in such a manner that the higher critical temperature to which whey may be subjected is never exceeded, but the full advantages of the double-effect evaporation are obtained.

The whole unit is extremely simple to operate, and has been very carefully designed with a view to giving complete access to the whole plant for cleaning, etc.

Milk Sugar

The foregoing deals with the preparation of dried whole whey. The manufacture of milk sugar, with and without the recovery of the mother liquor, is described below.

WATSON, LAIDLAW AND CO., LTD.

Our interest in whey is confined almost entirely to the production of milk sugar from whey.

There are various systems of treating the whey in the manufacture of milk sugar, one of these being to treat the whey with milk of lime and then condense the neutralised whey to about 60 per cent. in a vacuum pan. The thick syrup is run into shallow vats and occasionally stirred. By this time crystals have formed, and the sticky mass is mixed with cold water and then treated in a centrifugal machine to recover the lactose crystals, which are also washed in the centrifugal machine basket. About two-thirds of the milk sugar is recovered in this way, so that the effluent syrup is heated to boiling point, the coagulated albumen skimmed off and again concentrated. After cooling, the lactose is separated. The crude lactose is dissolved in hot water and the solution heated to boiling point after the addition of 1 per cent. of powdered charcoal and 0·2 per cent. acetic acid. The hot liquid is passed through a filter press and the clear

(*Continued on next page.*)

A double effect evaporator [George Scott and Son (London), Ltd.], as used for whey.

syrup concentrated and crystallised, the milk sugar being then separated, washed and dried.

Another system consists of scalding fresh whey, skimming off albumen and fat and condensing to about one-third of the original volume in an open pan. It is further concentrated *in vacuo* and run into large enamelled pans with slow rotary stirrers. Crystallisation takes place with cooling, and refining follows, as already indicated.

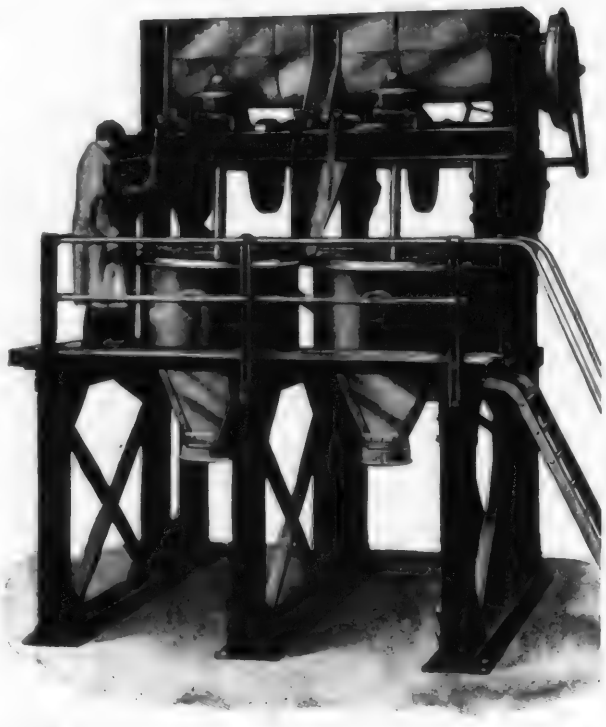
As makers of centrifugal machines, we are naturally interested in the recovery of the crystals from the mother liquors.

THOMAS BROADBENT AND SONS, LTD.

The machines shown in the illustration are installed in some large factories handling curds and whey from cheese factories.

The whey, as received, is filtered and clarified. After clarification it is specially treated and is then pumped into the tanks from which it is fed into the centrifugals. These are charged whilst running and centrifugalisation occupies about ten minutes. The milk sugar is washed by a special spraying arrangement, which removes most of the mother liquor during a further centrifugalisation. The semi-pure product is steamed in the centrifugal and, after testing, it is discharged from the plant for conveyance to another department, where further refinement and drying take place.

The effluent is a tan-coloured liquid, which sets into a jelly and may be used for mixing with pig food.



A 36" belt-driven centrifugal and washing apparatus used in the production of lactose. (Thos. Broadbent and Sons, Ltd.)

A NEW VITAMIN PRODUCT

IT HAS been claimed that people living on a general mixed diet get sufficient vitamins, but this is true only in very rare instances. The minimum daily human requirements of the four principal vitamins are dependent on a series of factors, and vary to a certain extent, but the average may be considered as about :

4,000	International	Units	Vitamin	A (I.U.A.)
300	,,	,,	,,	B_1 (I.U.B_1)
400	,,	,,	,,	C (I.U.C.)
250-500	,,	,,	,,	D (I.U.D.)

The first requirements in food are generally considered to be the acquisition of the necessary number of calories and the supply of vitamins is regarded as incidental. The vitamin which is most frequently short in the daily diet is vitamin D, which is found in few ordinary foodstuffs and then only in very small quantities. The general scarcity of vitamin D is, however, to some extent remedied by nature, a variation of the natural vitamin being formed by the influence of the sun's rays on the fat under the skin. This fat contains small quantities of ergosterol which, through the action of the ultra-violet rays of the sun, is partly converted into vitamin D_2 (calciferol). This formation of vitamin D is, however, dependent upon the human body getting an adequate supply of sunshine, and in the majority of cases this does not happen, especially during winter months in the Northern hemisphere and in countries which have a temperate climate, owing to the fact that the days are short and mostly lacking in sunshine. Furthermore, advantage cannot usually be taken of even the small amount of sunshine there is, for in large cities there is almost continually a layer of smoky, dusty atmosphere which absorbs the ultra-violet rays, and many people are forced on account of their work to spend most of the daytime in town instead of being able to enjoy the benefit of the sun's rays in the country. Even in Southern lands where bright sunshine is more frequent, the rays are prevented from reaching the human body by narrow streets, shuttered windows, and when the rays are allowed to penetrate through the glass the health-engendering vitamin D will not be formed because the window-glass absorbs the ultra-violet rays.

Amongst the protective foods—*i.e.*, those which are capable of correcting the most usual diet deficiencies—milk (and milk products) is first and foremost, followed by butter, green vegetables, fruit, and eggs. In these is to be found the highest quantity of vitamins of all general foodstuffs, but milk alone is the one containing all the essentials for life and growth. This, however, is only true in the case of good summer milk and perhaps butter made from such milk. Summer milk is supposed to contain about 1,000 I.U.A. and 20 I.U.D. per quart, and is usually understood to be milk from cows which are able to feed in the green fields. Under very favourable conditions the content may reach 2,000 I.U.A. and 50 I.U.D. per quart, whilst good summer butter may contain 12,000 I.U.A. and 230 I.U.D. per lb. It will be seen, therefore, that the vitamin D content in milk and butter is comparatively small even in summer, but in the winter it may decrease to practically nothing.

There is consequently no guarantee that the human organism is supplied with the necessary quantity of vitamins through a general mixed diet and sunlight, and this is beginning to be generally recognised by the medical profession of most countries. The Technical Commission of the Health Committee of the League of Nations emphasises the detrimental effect of the lack of vitamins in food when they state in their report on the " Physiological Basis of Nutrition " : " *Ordinary diets are usually inadequate in vitamin D, and except in sunny seasons and sunny countries a small daily ration of cod liver or other fish liver oil, rich in vitamin D, is to be recommended in the diet of the pregnant and nursing*

mother and in that of the growing child." And again in its general recommendations the Commission emphasises the need for provision of extra vitamin D wherever and whenever sunshine is not abundant, especially during the period of growth.

Milk and milk products are perhaps the foods which come first to the mind as being taken most regularly by people of all ages, but more especially by children who have the greatest need for an ample supply of vitamins. The natural conclusion is, therefore, that milk should be used as a means to introduce vitamins into the human organism in adequate quantities, and in several countries this is already recognised, but in others there are laws which prohibit any addition to milk as being adulteration. In spite of such out-of-date laws, however, we find vitamin D milk is manufactured and distributed in large quantities in several of the States of America. In Norway, Holland, and England margarine has been vitaminised for a number of years, and in Denmark a recent law which takes effect in January, 1938, prescribes that all margarine manufactured in that country must contain a certain number of units of vitamins A and D per kilo. Germany and several other countries are at present also discussing the question of vitaminising margarine.

In the past it has only been possible to vitaminise foodstuffs with *natural* vitamins to a very limited extent, because the only vitamin concentrates obtainable had an objectionable taste and smell which was passed on to the food. In order to add vitamin D to a product without impairing its taste and odour it was necessary to obtain the vitamin by means of irradiation with ultra-violet rays, and in America large quantities of vitamin D milk have been produced through direct irradiation; this has also been done to a limited extent in this country. It has been established, however, that irradiation with ultra-violet rays tends to destroy partly or totally the other vitamins, and a product treated in this way may be without any of the important vitamins A, B, and C.

Another means of adding vitamin D to foodstuffs has been with irradiated ergosterol (calciferol), but this is not as efficacious to the human organism as is vitamin D made from fish liver oil (natural vitamin D).

A product has now been put on the market, however, which overcomes all the previous difficulties of vitaminising foodstuffs with the natural vitamins A and D. This product, marketed under the name of " Covitol ", contains the natural vitamins only, made from fish livers, and is offered in the form of tasteless and odourless oil, emulsion or powder concentrates. By means of a simple mixing process these concentrates can be employed to vitaminise any foodstuff to any desired degree without impairing in any way whatever its taste or odour and without destroying the other vitamins which may already be present. Furthermore, these concentrates, if suitably stored, will keep for years. If all that is claimed for them is correct, they should come as a great boon to manufacturers and the public alike and contribute extensively towards a general improvement in public health and well-being.

Budapest Engineers Plan Revolving Globe Restaurant

Two Hungarians, Jozsef Lang and Agost Ulrichs, engineers, want to make Budapest famous by giving the city an edifice which would be unique in all the world. They propose to build a look-out tower 200 feet high, surmounting which would be a huge globe with the map of the earth painted on it in blazing colours. This revolving globe would not only display to every part of the capital the geography of the earth, but would also accommodate within people desirous of enjoying the view of Budapest.

The designers plan to have the tower established on either of two busy squares of the city. The tower would be of steel girder construction beneath which the traffic could go on undisturbed. Surmounting the steel edifice would rest the huge globe, some 215 feet in circumference. The globe would revolve on a vertical axis once in twenty-four hours. The continents painted on it would be yellow and the seas blue. At night the entire globe would be glowing with neon lights of appropriate colours.

From outside, then, this curious edifice would be more effective than any of the other monuments which have made cities famous. But it would be even more interesting inside. The interior of the globe would be divided into compartments, each measuring about 230 square yards. The first floor would be occupied by kitchens and storage rooms, the second, third, and fourth by restaurants and cafes. Huge windows would offer a gorgeous view to those sitting in this house of entertainment, which in summer would be provided with cooling apparatus and in winter with central heating. Lifts would take up the guests first to the top of the steel tower and then in the interior of the globe to whichever floor they desired.

The revolution of the globe, while too slow to cause discomfort to those inside, would enable sightseers to catch glimpses of ever fresh parts of the city. And while, at night, they could gaze down upon the illuminated city lying far below, those on the streets could enjoy the spectacle of the radiant globe glowing high above the city.

Czechoslovak Conserve Development

LARGE quantities of fruit are grown in Sub-Carpathian Russia, the easternmost part of Czechoslovakia, but owing to lack of transport facilities prices are so low, and growers are left with heavy crops on their hands which the local markets cannot absorb. The fruit, especially plums and apricots, are of high quality and, according to the local press, a sorting station and conserve factory is to be erected at the valley town of Tačevo, in the surroundings of which some 20,000 to 30,000 tons of fruit are grown annually. The storage building and jam factory are together expected to cost £25,000, the state being part guarantor.

Destruction of Weevils in Kola Nuts

IN the report of the Entomologist to the Department of Agriculture for the period July-December, 1936, mention is made of work that has been done on the problem of infection of kola nuts by weevils and their eggs. Treatment for five hours in a 3 per cent. vapour concentration of carbon bisulphide killed the eggs, whatever their stage of growth, without harming the nuts. Four hours' treatment was insufficient.

Sodium silicofluoride is recommended as a treatment against the adult weevil. This should be laid as a dust on the floor, and proves fatal in from three days to a week.

INFORMATION and ADVICE

Sweet Pickle Liquor—Essence of Black Currant—Cream Cheese—Whole Wheat Vermicelli—Manufacture of Cream Powder—Growing and Canning of Green Peas—Use of "Improvers" for Flour—Converting Soya Bean into Food Products—Koumiss—Solid Matter in Tomato Purée, etc.

Sweet Pickle Liquor

2,578. *Could you provide us with a formula for a cheap sweet pickle liquor?* (Lancashire.)

We publish a formula and also the method:

White sugar	30 lb.
Sago flour	4 ,,
Turmeric	½ ,,
Cayenne	¼ ,,
Ground ginger	½ ,,
Celery seed	¼ ,,
Caramel	1 ,,
4½ per cent. of acetic acid and water ..	6 gal.
Raw onions, peeled and chopped fine	1 lb.
Garlic, peeled and chopped fine ..	¼ ,,
Mustard	1 ,,
Table salt	1½ ,,

Method.—Make a thin paste of the sago flour with 2 gal. of the acid and water, put balance of acid and water into a steam pan, and add salt and sugar. Then pass spices through a fine sieve into it, then pass sago, acid and water through the same sieve into it. Bring to the boil, and add caramel. Now add the chopped vegetables and simmer for 15 minutes. If not dark enough add more caramel, turn out into a tub, and let stand until cold.

Essence of Black Currant

2,644. *We would be obliged if you could supply a recipe for a synthetic soluble essence of black currant, suitable for use with an acidulated syrup.* (Glasgow.)

We suggest that you get into touch with manufacturers of these synthetic soluble essences. We do not consider it would be worth your while to attempt to make these yourselves.

Cream Cheese

2,570. *Will you please send us a cheap recipe for making cream cheese?* (Manchester.)

Add 5 lb. of dry skim milk to 93 lb. of sweet cream testing 40 to 42 per cent. milk fat. Then add 0·5 lb. of ground agar and 0·75 lb. of salt. The cream should be well agitated as the dry skim milk and agar are slowly added. Pasteurise at 180° F. for 5 minutes. Cool to 111° F. Add 0·75 lb. of commercial starter. Homogenise at 3,500 lb. pressure, using no strainer in the intake pipe-line The homogeniser should have been previously run with water at 160° F. or above. Place the cheese immediately into the final package. Chill in a refrigerator at 40° to a temperature of 70° F. and incubate for 12 to 24 hours to develop an acid flavour. Then chill to and hold at 40° F.

Reducing the skim milk solids to 3 per cent. tends to soften the body of the cheese; as does decreasing the homogenisation pressure to 3,000 lb.

Presumably you will have some automatic means of spreading the cheese on the biscuits. Flavourings such as celery, relish, etc., can be added. Old cheese, such as Cheddar, can be re-processed by grinding into a paste with butter or other cheeses such as Neufahater, Roquefort, Swiss, etc., depending on the flavour desired. Many combinations and flavours can be obtained in this way.

Whole Wheat Vermicelli

2,324. *Could you please give me a formula for the manufacture of whole wheat vermicelli?* (South India.)

We are sorry to be unable to help you, but we are unable to obtain this formula.

An article on Macaroni Products appeared in the February issue of FOOD MANUFACTURE, and perhaps you would like to experiment along the lines given in this article, using a very fine wholemeal flour.

Manufacture of Cream Powder

2,326. *Could you please give us information regarding the manufacture of cream powder? We have been informed that pyrophosphate is used to a very considerable extent in cream powders.* (Gloucester.)

It is usually diluted with an ordinary neutral phosphate until it is of cream of tartar strength—*i.e.*, when two parts of the mixture react with one part of bicarbonate of soda as would be obtained with cream of tartar—generally a 15·6 per cent. basis. The after reaction should be just acid in the finished goods after baking.

Growing and Canning of Green Peas

2,334. *Will you kindly give me particulars of all up-to-date publications in connection with the growing and canning of green peas?* (Peterhead.)

A great deal of information has appeared in the *Food Industries Weekly* and in FOOD MANUFACTURE, over the past three years on the subject of the canning of green peas.

The *Food Industries Manual*, published annually, has a section on "Canning", and is, in fact, an encyclopædia of canning.

There is also *Canning, Preserving and Pickling*, an American publication for which we are agents.

Use of "Improvers" for Flour

2,560. *Would you advise me* re *use of "improvers" for flour on large scale, and best means of effecting perfect admixture where additions may be only a few lb. per sack.*

Our wheats are very soft and current prices do not admit of importing foreign wheats.

What improvers have we to select from, and how best to use them for various purposes of our particular flours?

1. *Calcium acid phosphates for miller plus soda.* 30-32 *to* 24.

2. *Acid sodium pyrophosphates for baker plus soda* ½ : 1.

3. *Mixture of two above: ounces per sack?*

To what extent may other flours be introduced for various purposes? For cheapest trade?

Would you give me also best formula for "proving" small trial mixes?

What small laboratory equipment do you advise? Anything new in bleaching?

I should be very grateful if you could help us in this matter. (Cape Town.)

The following headings may assist you:

Solid Improvers.

Persulphates (old name Salox).
Acid Calcium Phosphate (Ibex).
Arkady mixtures.

Many firms market the first group, the second and third are proprietaries.

These improvers may be weighed out in correct amounts and incorporated in a mixer, the weighing may be made automatic.

For very soft wheats ammonium persulphate (Salox) would be suitable.

Proving Trial Mixes.

We recommend the procedure described in *Cereal Chemistry*, July, 1930. This paper gives complete details of an automatic proofing device and quantities used. Employing a straight dough method 360 grm. flour, 11 grm. sugar, 11 grm. yeast, 7 grm. shortening, 7 grm. salt, 2 grm. malt flour and 1 grm. Arkady are mixed in a twin air Hobart Mixer with enough water to make a dough of proper consistency. Fermentation time is 2 hours and 10 minutes with two punches, one 60 minutes after mixing and a second after 40 minutes and, after an additional 30 minutes, the dough is moulded by machine. All doughs are proofed in humidified air with the air of the proofing device referred to above. Further details could probably be obtained from Grain Research Laboratory, Winnipeg, Canada.

The laboratory equipment depends entirely on the size of the laboratory. We suggest you employ a chemist and let him equip the laboratory and carry out tests for you.

Converting Soya Bean into Food Products

2,610. *It has been found that the soya bean grows well in this part of India and information is therefore required regarding the conversion of soya bean into food products. I should be grateful for some general information regarding the capital cost of plant and working expenditure and also a list of the products into which bean can be converted, together with their approximate selling prices.* (Peshawar.)

This is too large a subject to reply to in this place. We advise you to consult the following books: *The Soybean*, and a smaller book, *The Soya Bean*, which give a lot of information. Various Bulletins have also been published by Agricultural Experimental Stations in the United States and Canada.

Koumiss

2,916. *I have been engaged in making a fermented milk known as koumiss, but have not met with success, and, being a regular reader of your journal, I should be obliged if you could forward me a recipe for making this drink. I have used separated milk, which is sweetened and then fermented with yeast, the whole being kept at a temperate of* 100° *F. for* 32 *hours. Will you please state whether separated or whole milk should be used?* (Lancashire.)

You do not state what the precise difficulty is, and, of course, such information would have been useful in aiding us to diagnose the trouble.

In the countries where koumiss is widely used it is made from mare's milk. No yeast is used for fermentation, but a proportion of soured milk must be added to supply the necessary ferment. According to literature, when cow's milk is used a certain proportion of soured milk is used, but the additional small proportion of canned sugar and yeast is added. Coagulation takes place, but the casein is partly redissolved as fermentation proceeds.

Solid Matter in Tomato Purée, etc.

2,927. *Can you tell us how to estimate the percentage of solid matter in tomato purée, apple pulp, etc.? Evaporation at* 100° *C. of the former causes considerable blackening. Does this mean any loss of weight of the solids?* (London.)

This method of estimating the percentage of solid matter in the materials you mention gives results sufficiently exact for all industrial purposes.

The materials should, of course, be spread out in a thin layer on a flat porcelain dish. Blackening occurs with nearly every material, and there occurs a slight amount of decomposition so that one might say that almost any moisture determination of organic materials is arbitrary. There are, of course, refinements such as vacuum drying, but in industrial control your method is sufficiently accurate.

Materials and Equipment Required

We have received enquiries concerning the suppliers of the following equipment and materials, and suitable recommendations have been made.

3,054. *Agent for "Avizol," the candy dryer and bleacher.* (Devonshire.)

2,933. *One or two up-to-date and reputable firms who specialise in refrigeration, air conditioning, and air cooling plant.* (Lancashire.)

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NEW COMPANIES

Alpine Ice-Cream Dairy Company, Limited. (331,335.) Registered September 6. Dolcoed, Carmarthen Road, Newcastle Emlyn. To carry on the bus. of ice-cream mnfrs., dairymen, etc. Nom. Cap.: £5,000 in £1 shares.

Banana Products, Limited. (330,988.) Registered August 25. To carry on the bus. of mnfrs., canners and vendors of and dlrs. in preserved, patent, malted, cooked and concentrated food, food products, etc. Nom. Cap.: £100 in £1 shares. Permt. dirs.: J. Elliott, 40, Bushey Way, Park Langley, Beckenham; W. Hibbert, 35, Rusham Park Avenue, Egham, Surrey.

Beale's (Properties), Limited. (330,681.) Registered August 12. 370, Holloway Road, Holloway, N. 7. To take over the bus. cd. on at Holloway, N. 7, being the undertaking of Beale's, Ltd., restaurateurs, bakers and provision mchts. Nom. Cap.: £40,007 in £1 shares. Dirs.: T. E. Beale, 7, Chestnut Close, Southgate, N. 14; J. H. Beale and Mrs. F. Beale, 7, Beacon Hill, Holloway, N.

Beaufort Hotel (Chepstow), Limited. (330,849.) Registered August 20. To carry on the bus. of hotel proprs., etc. Nom. Cap.: £5,000 in £1 shares. Dirs.: To be appointed by the subs.

Bowden's Biscuits (South Molton), Limited. (330,987.) Registered August 24. To acquire the goodwill of the biscuit mnfg. bus. of Bowden and Co., of South Molton, Devon. Nom. Cap.: £2,000 in £1 shares. Dirs.: F. L. Symons, Southmead, Park Lane, Barnstaple; D. L. Hoad, 128, East Street, South Molton.

Brays Stores (Bodmin), Limited. (330,972.) Registered August 24. To take over the bus. of provision and genl. mchts. cd. on at Honey Street, Bodmin, Cornwall, as "Brays Stores". Nom. Cap.: £2,500 in £1 shares. Dirs.: T. W. R. Bray, Tashmoo, Deepdene Avenue, Dorking, Surrey; A. H. Bray and J. R. Bray, of 4, Honey Street, Bodmin.

F. J. Broad and Company, Limited. (330,935.) Registered August 23. 29, Market Place, N.W. 11. To carry on the bus. of coffee, chicory and tea mchts., etc. Nom. Cap.: £750 in £1 shares. Dirs.: F. J. S. Broad, 22, Ossulton Way, N. 2; E. C. Herbert, Grand Avenue, Muswell Hill, N. 10; D. N. W. Jackson, Highways, Woldingham, Surrey.

Chadwick Manor Hotels, Limited. (330,990.) Registered August 25. To carry on the bus. of hotel-keepers, etc. Nom. Cap.: £10,000 in £1 shares (5,000 "A" and 5,000 "B"). Dirs.: To be appointed by the subs.

H. H. Clarke (Provision Merchants), Limited. (330,945.) Registered August 23. St. Katharine's House, 69-70, Mark Lane, E.C. 3. To carry on the bus. of grocers, provision mchts., etc. Nom. Cap.: £5,000 in £1 shares. Dirs.: H. H. Clarke, 26, Clyde Road, Wallington, Surrey; G. W. Housden, 245, Beehive Lane, Ilford, Essex.

Cream Line Milk Bars, Limited. (330,708.) Registered August 14. 53, Doughty Street, W.C. 1. To carry on the bus. of purveyors of milk, etc. Nom. Cap.: £100 in 95 ord. shares of £1 and 100 def. shares of 1s. Dirs.: I. Cripps, Flat No. 1, 93, Upper Clapton Road, E. 5; S. Franklin, 30, Cazenove Road, N. 16; D. Cripps, 130, Pennine Drive, N.W. 4.

Dr. Gilbert's Health Foods, Limited. (330,895.) Registered August 21. 38, Swinegate, Grantham. To carry on the bus. of mnfrs. of and dlrs. in health foods, drinks and substances, etc. Nom. Cap.: £1,000 in 1s. shares. Life dirs.: H. Gilbert, Church Trees, Grantham (ch. and mng. dir.); Agnes Gilbert, Church Trees.

L. Greenman and Sons (Bakers), Limited. (331,050.) Registered August 26. 54, Finsbury Pavement, E.C. 2. To carry on bus. as biscuit mnfrs., bakers, confectioners, etc. Nom. Cap.: £500 in £1 shares. Dirs.: L. Greenman and H. A. Baker, of 21, Brady Street, Whitechapel, E. 1.

William Guinan and Company, Limited. (330,812.) Registered August 18. To take over the bus. of bottlers and mineral water mnfrs. cd. on at Liverpool as "William Guinan and Co." Nom. Cap.: £15,500 in £1 shares (12,000 pref. and 3,500 ord.). Dirs.: Mrs. B. Spencer, Guildford, Woolton Road, Gateacre, Liverpool; J. H. Smith, 39, High Street, Wavertree, Liverpool.

Hants and Dorset Mineral Water Company, Limited. (330,946.) Registered August 23. West Street, Poole, Dorset. To take over the bus. of mnfrs. of and dlrs. in mineral waters cd. on by Strangers, Ltd., at Poole and elsewhere. Nom. Cap.: £7,000 in £1 shares. Dirs.: A. R. Pope, South Court, Dorchester; R. J. Stranger, M.C., 24, Millbrook Road, Southampton; A. C. R. Pope, Sharnal, Coburg Road, Dorchester; P. W. R. Pope, South Court, Dorchester; A. H. Abbott, Portman Cottage, Boscombe; H. G. Wheadon, The Hollies, Fosse Andre, St. Peter Port, Guernsey.

Health Drinks, Limited. (331,597.) Registered September 15. 15-18, Finsbury Court, Finsbury Pavement, E.C. 2. To sell milk, cream and consumable commodities, caterers and proprs. of milk shops, etc. Nom. Cap.: £600 in £1 shares (300 pref. ord. and 300 ord.). Permt. dirs.: D. Davy, 164, Chiltern Court, Baker Street, N.W. 1; F. Abdela and B. N. C. Moss, 34, Moreland Court, N.W. 2.

Hereford Milk Bar and Dairy Company, Limited. (330,975.) Registered August 24. To carry on the bus. of proprs. of milk and snack bars, etc. Nom. Cap.: £2,000 in £1 shares. Dirs.: Mrs. D. S. Perkins and T. W. M. Perkins, of Ufton Court, Holme Lacey, Herefordshire; Mrs. A. E. Perkins, Lugwardine Court, near Hereford; H. J. Burleton, Ayltonbury, Belmont Road, Hereford; H. J. G. Burleton, The Cot, Newtown, Holme Lacey. Qual. of dirs.: 100 shares. Remun. of dirs.: £5 each per annum.

Lexel, Limited. (331,003.) Registered August 25. Morley House, 314-322, Regent Street, W. 1. To acquire the benefit of a licence relating to the aeration of cream. Nom. Cap.: £1,600 in £1 shares (1,500 pref. and 100 management). Permt. dirs.: P. Alexander, Grove Hall Court, Hall Road, N.W.; H. Cutts, 177, Lichfield Court, Richmond, Surrey.

MacPhersons (Wine and Spirits), Limited. (331,651.) Registered September 16. 7, Grey Street, Newcastle-on-Tyne. To take over the bus. of a wine and spirit mcht. cd. on by J. E. Macpherson at Newcastle-on-Tyne. Nom. Cap.: £10,000 in £1 shares. Dirs.: J. E. Macpherson, 21, Brandling Park, Newcastle-on-Tyne; E. E. Bustard, 1, Treherne Road, Newcastle-on-Tyne.

Miloko Products, Limited. (331,007.) Registered August 25. To take over the bus. of mnfrs. and distributors of chocolate crumb cd. on by Frederick Boehm, Ltd. Nom. Cap.: £6,300 in 6,000 pref. shares of £1 and 6,000 ord. of 1s.

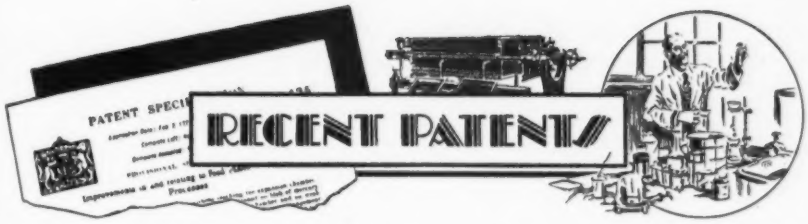
Modern Home Food Manufacturers, Limited. (330,802.) Registered August 18. 15-17, Finsbury Court, Finsbury Pavement, E.C. 2. To carry on the bus. of mnfrs. of and dlrs. in self-raising and sponge-cake flour, etc. Nom. Cap.: £5,000 in 4,500 pref. shares of £1 and 10,000 ord. of 1s. Dirs.: L. Jaffe, Bembridge Hotel, Hendon, N.W.; M. W. Moiseiwitsch, 29, Alderney Avenue, Hounslow.

W. J. Owen, Limited. (331,494.) Registered September 10. To take over the bus. of a flour and genl. mcht. cd. on by W. J. Owen at 7, Castle Square, Caernarvon. Nom. Cap.: £3,000 in £1 shares. Dirs.: W. J. Owen, Llwyn Celyn, St. David's Road, Caernarvon (permt.); Miss A. Davies, same address. Qual. of dirs.: Ten shares.

Robt. Roberts and Company (Food Purveyors, Bangor), Limited. (330,628.) Registered August 10. To take over the bus. of tea and coffee mchts., grocers and provision mchts., etc., cd. on at 243, High Street, Bangor, as "Robt. Roberts". Nom. Cap.: £3,500 in £1 shares. Dirs.: E. Edwards, Anneddle, Upper Garth Road, Bangor (permt. gov. dir. and ch.); E. Edwards, Isallt, Upper Garth Road; I. Edwards, Anneddle, Upper Garth Road. Qual. of dirs.: £50 shares.

White Queen, Limited. (330,920.) Registered August 21. 59-60, Chancery Lane, W.C. 2. To carry on the bus. of mushroom growers, agriculturists, etc. Nom. Cap.: £100 in 1s. shares. Dirs.: Diana E. Losee (permt. mang. dir.) and D. W. Losee (permt.), both of 56, Queen's Gardens, Lancaster Gate, W. 2.

The above-mentioned particulars of new companies recently registered have been extracted from the daily register of Messrs. Jordan and Sons, Ltd., company registration agents, Chancery Lane, W.C. 2.



These particulars of New Patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The "Official Journal of Patents" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Latest Patent Applications

23385. MEURER, N.: Devices for charging liquids with carbon dioxide.
23509. DOXEY, H. L.: Device for softening butter, etc.
23612. KALIN, L.: Apparatus for beating, etc., creams.
23665. ASKEYS PREMIER BISCUIT CO., LTD.: Wafer-biscuit containers for dispensing ice-cream, etc.
23754. QUARMBY, J.: Ranges for fish-frying, etc.
23805. LOWE FOOD PRODUCTS CO., LTD., J.: Preparations of ice-cream, etc.
23884. BARNES, H.: Food preparations.
23911. REBOIS, L. V.: Toasting-machines.
23988. BINGHAM, G. C.: Machines for blending tea, etc.
24140. TEATINI, D.: Purification of sugar juices. September 3.
24439. COLOMBO COMMERCIAL CO., LTD., YOUNG, A.: Treatment of green-leaf tea. September 7.
24457. HEDGES, C. DE F.: Containers for syrup, etc. September 8.
24458. WALKER, A. G.: Means for drawing off impurities from liquids.
24463. BRIDGNELL, C. K.: Green-tea leaf sorters, etc. September 8.
24576. LAING, J.: Food-preserving cans. September 9.
24598. GERSTLE, H., SALZBURG, A.: Production of starch for food purposes. September 9.
24646. CLAYTON, C. E. EVERY- (HYDRO-GROECK GES.): Methods of boiling, etc., foods, etc. September 9.
24681. KODAK, LTD. (EASTMAN KODAK CO.): Treatment of foodstuffs. September 10.
25300. HADDAN, R. (KELCO CO.): Manufacture of milk-soluble alginate compounds. September 17.

Complete Specifications Accepted

471,180. COLES, G. H. N.: Crushing, grinding and pulverising machines.
471,192. WRIGHT, F. H., and LEWIS, E. W.: Machines for peeling vegetables and the like. (February 29, 1935.)
471,248. BARLOW, R., COWAN, A. F., and WORTHINGTON, J.: Tin boxes and like containers. (January 30, 1936.) (Cognate application 33723/36.)
471,254. KNOWLES, R. J., SPRINGETT, A. H., and FARRELL, J. A.: Taps and cocks for controlling fluid. (March 5, 1936.)
471,328. SPIESS, P.: Cooking vessels. (February 28, 1935.)
471,338. HAYWARD, R. A.: Printing and coating papers for use as wrappers, particularly for food products. (June 17, 1936.)
471,620. HIRSCHMANN, O.: Preservation of meat.
471,724. CHEMISCHE FORSCHUNGSGES: Skin for sausages, pies and the like. (April 11, 1935.) (Divided out of 463,353.)
472,029. HALASZ, S.: Processes for the production of oats preserve in the form of briquettes. (March 18, 1936.)
472,104. WRIGHT, L. M.: Treatment of tea.
472,466. PLEWS, W. J.: Apparatus for the puffing of cereals and the like.
471,450. ARMSTRONG, J. J. V. (PHŒNIX METAL CAP CO., INC.): Closure caps for bottles, jars and the like containers. August 13, 1936.
471,638. HOVEMAN, J. A. C. A.: Method of freezing and preserving foodstuffs and other substances. (October 4, 1935.)
471,739. MARSDEN, L., LAPIDUS, J., and MARSDEN, P.: Biscuit-making machines.
472,057. EUGSTER, E. J. P.: Siphon heads for mineral water siphon bottles and similar containers. (March 26, 1936.)

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

Abstracts of Recent Specifications

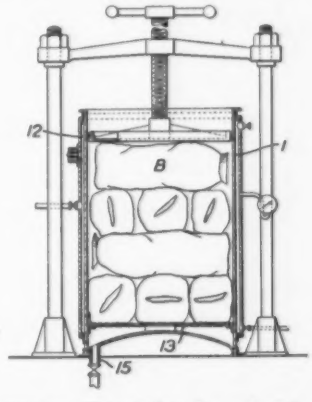
Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume, or in bound volumes price 2s. each.

466,882. **Treating oil seeds.** STANDARD BRANDS, INC.
An enzyme-containing flour is prepared from oil-bearing seeds, beans and the like by extracting the oil from the seeds, etc., with a solvent, removing the solvent containing the oil by pressure, drying the residue and grinding it to flour, the temperature throughout the treatment being below the decomposition temperature of the enzymes in the original material, and in any case below 70° C. The material—*e.g.*, comminuted soy beans—is admixed with a solvent—*e.g.*, ethyl acetate—in an amount sufficient thoroughly to wet the meal—*e.g.*, an amount equal to the volume of the meal—the temperature being maintained below 50° C., and preferably at 30° to 40° C. The solvent-treated meal is then freed from the solvent by subjecting to pressure—*e.g.*, a pressure of 5,000 lb. to 15,000 lb. per square inch—*e.g.*, in a filter press. Before the application of pressure part of the solvent may be removed by filtration or centrifuging. After pressing, the residue is dried at a temperature of below 50° C. and ground to flour. Other solvents specified are acetone, benzene and petroleum ether.

467,370. **Medicines; food preparations.** SPALDING, C. G., and GOULD, G. R.
Pectin for use as a medicine is coated with a fatty material—*i.e.*, an edible fat or oil or a higher fatty acid—to inhibit the swelling of the pectin in contact with water. The coating may be applied molten or in solution in a volatile solvent. Phenolphthalein, cascara or other laxative drugs may be mixed with the pectin before coating. The coated pectin may be used in making bakery products and cereal preparations.

467,678. **Cheese.** NOKAK, B.
An increased yield of cheese is obtained from milk by adding to the milk, prior to its treatment with rennet, a small amount of a gum which on hydrolysis yields an acid and a carbohydrate—*e.g.*, gum obtained from the bark of tragacanth bushes, carob bean seeds, linseed, fleawort seeds or mallow root. The gum may alternatively be added in admixture with the rennet, which may be in dry or liquid state. The temperature may be increased during the addition.

468,061. GROUP III. **Extracting fat.** KERNOT, J. C.
Fat is extracted from butchers' offal and meat of low value by mechanical pressure at raised temperature in presence of a proportionately large volume of water curtaining a surface-tension reducing agent, the meat being between surfaces permeable



to liquids. Extraction by solvent may follow. Agents specified are froth-forming agents, emulsifying agents and wetting agents; examples include alcohol, phenol, sulphonates of phenol, of benzene or of naphthalene, and dilute alkalies—*e.g.*, 0·2 to 0·3 per cent. sodium hydrate or carbonate. Suitably, 13 kgm. of offal in bags B and 60 litres of water containing 120 gm. of sodium carbonate or sodium naphthalene sulphonate are kept at 100° C. for two hours in a jacketed tank 1; the offal is then compressed between perforated plates 12, 13, and the liquids withdrawn through a valve 15. The operation may be repeated and the residual offal subjected to further pressure and then dried for use as or in the production of animal foodstuffs or fertilisers.

LATEST TRADE MARKS

This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal", and is published by permission of the Controller of H.M. Stationery Office. The "Trade Marks Journal" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

COPROCO.—579,245. **Substances used as food or as ingredients in food.** CORN PRODUCTS COMPANY, LIMITED, Bush House, Aldwych, London, W.C. 2. October 6. (Associated.)

DEJESTEEVTEE.—565,613. **Tea.** HUDSON BROTHERS, LTD., Gillingham House, Gillingham Street, Victoria, London, S.W. 1; Gervis Place, Bournemouth; and 21, Chequer Street, St. Albans. September 22. (Associated.)

Registration of this trade mark shall give no right to the exclusive use of the words "The Sign of Quality" or the word "Dejesteevtee".

D. & S.—577,388. **Oatmeal and rolled oats for food.** THE QUAKER OATS COMPANY, Board of Trade Buildings, 141, West Jackson Boulevard, Chicago, County of Cook, State of Illinois, United States of America. September 15. (Associated.)

Registration of this trade mark shall give no right to the exclusive use of the letters and abbreviation "D & S."

ELECTA. — 577,665. **Canned poultry, canned game, canned fish, canned vegetables, canned fruits and canned meats.** MACPHERSON, TRAIN AND COMPANY, LTD., Adelaide House, London Bridge, London, E.C. 4. September 29. (Associated.) (By Consent.)

Canned poultry, canned game, canned fish, canned vegetables and canned fruits, and goods of the same description will be struck out from the goods of registrations Nos. 224,505 (1124) and 284,977 (1505) if and before the applicants' mark is registered.

EMEFPRO.—579,490. **Edible oils, edible fats, and oils and fats for cooking.** MERSEYSIDE FOOD PRODUCTS, LTD., 51, North John Street, Liverpool.

ESCO. — 576,643. **Canned meats, and tongues in glass jars.** S. D. SIMOND AND CO., LTD., Peninsular House, 28, Monument Street, London, E.C. 3. September 15. (Associated.) (By Consent.)

EPICURE. — B 576,131. **Pickles, malt vinegar, sauces, salad dressings, mayonnaise and ketchups.** OCEAN PRESERVING COMPANY, LTD., Epicure Works, Alfred's Way, Barking By-Pass Road, Barking, Essex. September 22.

User claimed from November, 1924. Section 21.

GLENALVA.—579,667. **Butter.** MAYPOLE DAIRY CO., LTD., 179 to 189, City Road, London, E.C. 1. October 6.

GOLDEN TREE. — 579,055. **Chocolates, confectionery and biscuits.** THE GARDEN CITY CANDY COMPANY, LTD., 4, Dove Court, Old Jewry, London, E.C. 2. September 22. (Associated.)

MASCOT. — 578,744. **Canned salmon.** BRITISH COLUMBIA PACKERS, LTD., Foot of Campbell Avenue, Vancouver, British Columbia, Dominion of Canada. October 6.

NICKY.—577,396. **Chocolate and chocolate confectionery.** J. S. FRY AND SONS, LTD., Somerdale, Bristol. September 29. (By Consent.)

QUEEN OF THE LAKES. — 578,438. **Toffee.** BAWDEN'S WINDERMERE TOFFEE, LTD., Lakes Toffee Works, North Terrace, Windermere. September 15.

The applicants undertake to use the mark only on goods manufactured at Windermere.

SEAGULL.—577,563. **Substances used as food or as ingredients in food, but not including tea, coffee and chicory, and mixtures of same, flour or liquorice sticks, and not including any goods of the same description as any of these excluded goods, and not including foods for birds, or eggs.** HENRY W. PEABODY AND CO. OF LONDON, LTD., 16, Eastcheap, London, E.C. 3. October 6.

SILVER IMP.—578,053. **Substances used as food or as ingredients in food, but not including improvers for brown bread, chocolate confectionery, sugar confectionery or flour confectionery, and not including any goods of the same description as any of these excluded goods.** GARDNER, TITLEY AND WIDGERY, LTD., 14/16, Queen Square, Bristol, 1. October 6. (Associated.)

Registration of this trade mark shall give no right to the exclusive use of the word "Gardner's".

SHRIMETTE.—579,696. **Fish pastes and meat pastes.** THE SHIELDS ICE AND COLD STORAGE COMPANY, LTD., The Shields Preserving Works, Fish Quay, North Shields. October 6.

TINYBEST.—578,982. **Canned fish, canned meats, fish pastes and meat pastes.** THE SHIELDS ICE AND COLD STORAGE COMPANY, LTD., The Shields Preserving Works, Fish Quay, North Shields. September 22.

Registration of this trade mark shall give no right to the exclusive use of the words "Tinybest".

VICTO.—579,480. **Edible oils and edible fats.** J. LYONS AND CO., LTD., Cadby Hall, Hammersmith Road, Kensington, London, W. 14. September 22.

WINGS.—567,551. **Bacon, hams, cheese,**

butter, eggs, lard (for food). I. BEER AND SONS, LTD., 15, King Street, West Smithfield, London, E.C. 1 September 22. (Associated.) (By Consent.)

The above-mentioned goods, and goods of the same description, will be struck out from the goods of registration No. No. 476,197 (2551) if and before the applicants' mark is registered.

579,122.—**Biscuits.** PEEK, FREAN AND

Co., LTD., 158, Drummond Road, London, S.E. 16. September 15. (Associated.)

579,515.—**Substances used as food or as ingredients in food.** PAUL BROS, LTD., Homepride Mills, Dock Road, Birkenhead; Robbins and Power Mills, Wheatley Street, Coventry; and Foster Mills, Station Road, Cambridge. October 6. (Associated.)